THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1840.] LONDON, AUGUST 16, 1898. [50TH YEAR. PRICE 6d.

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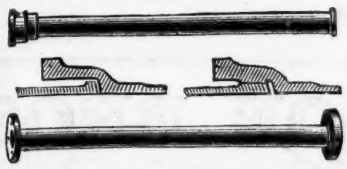

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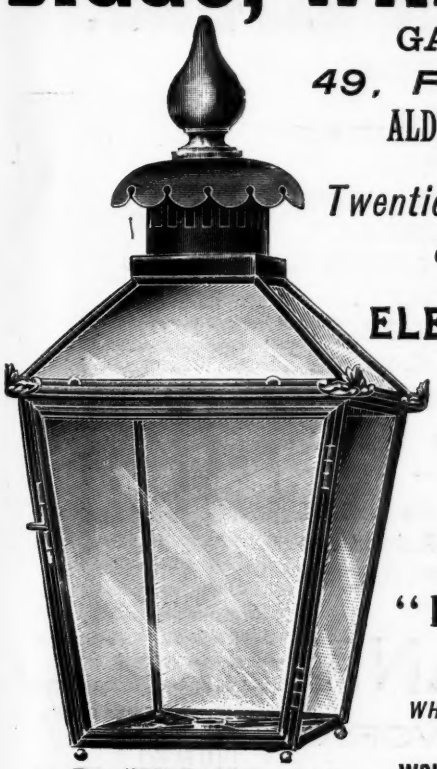
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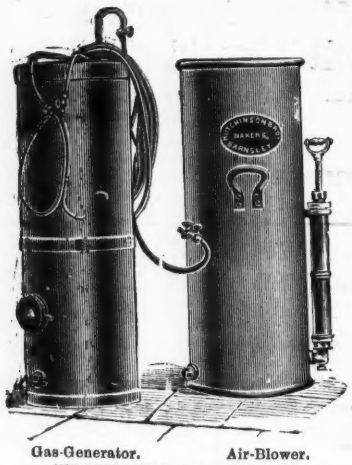

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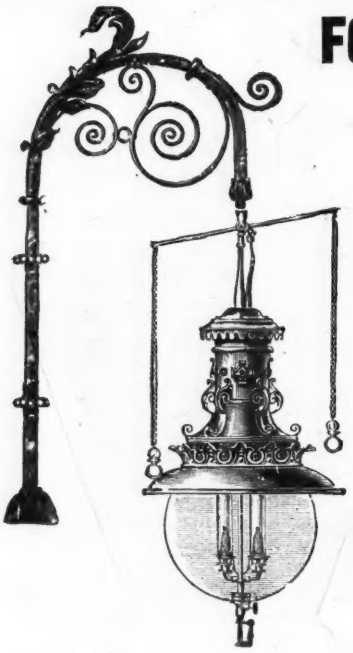

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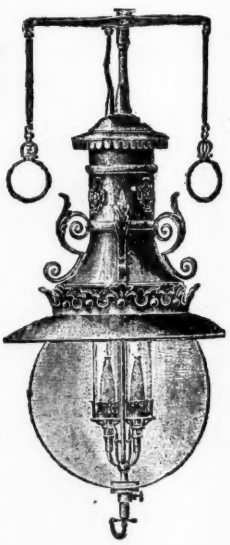

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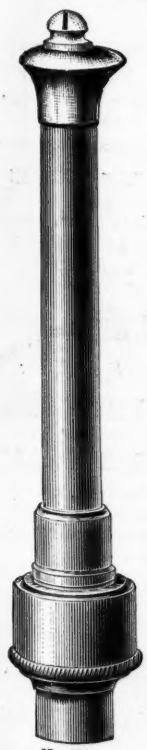

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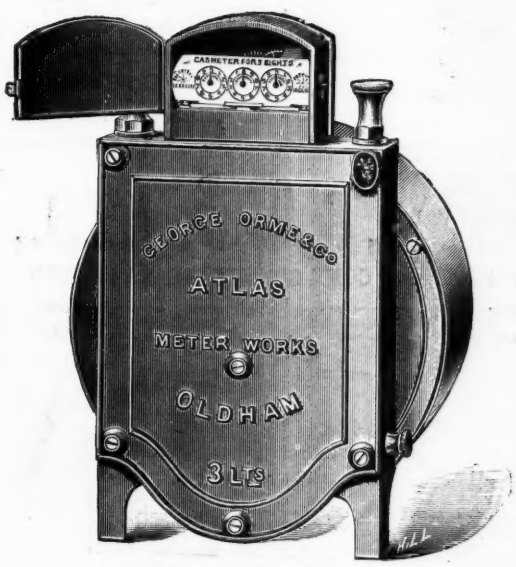

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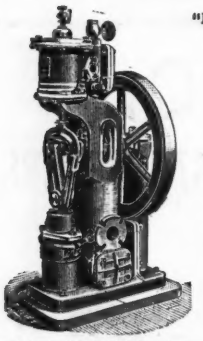

Fig. 703. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

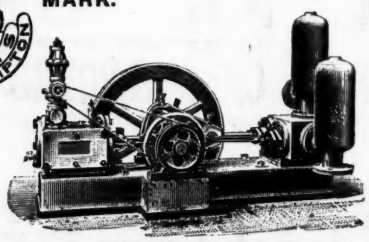

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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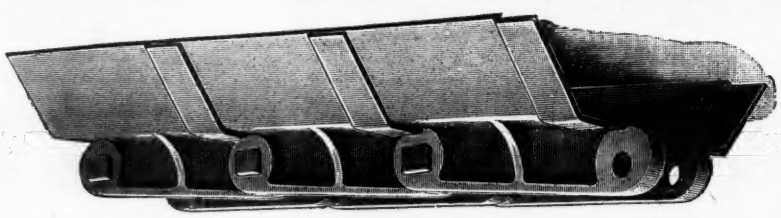

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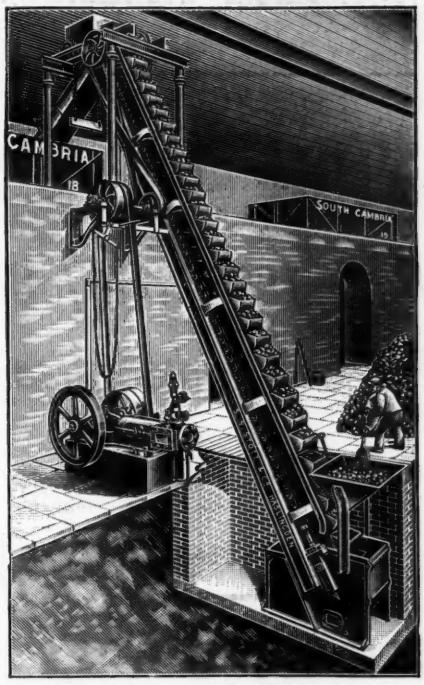

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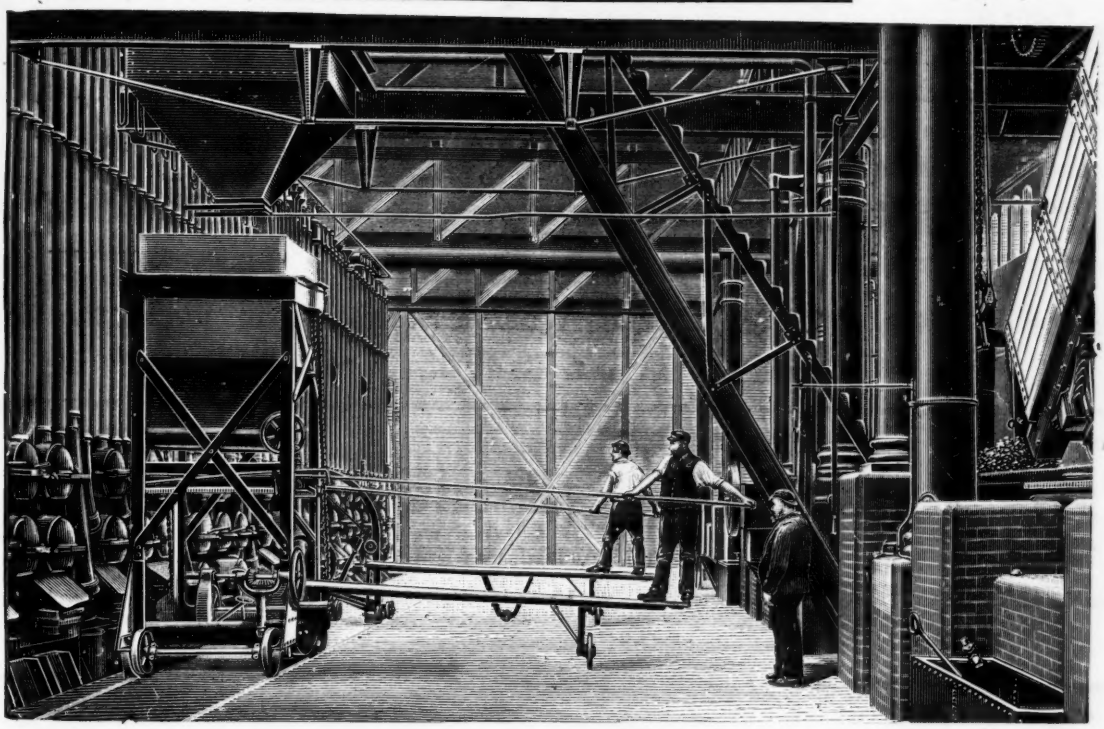

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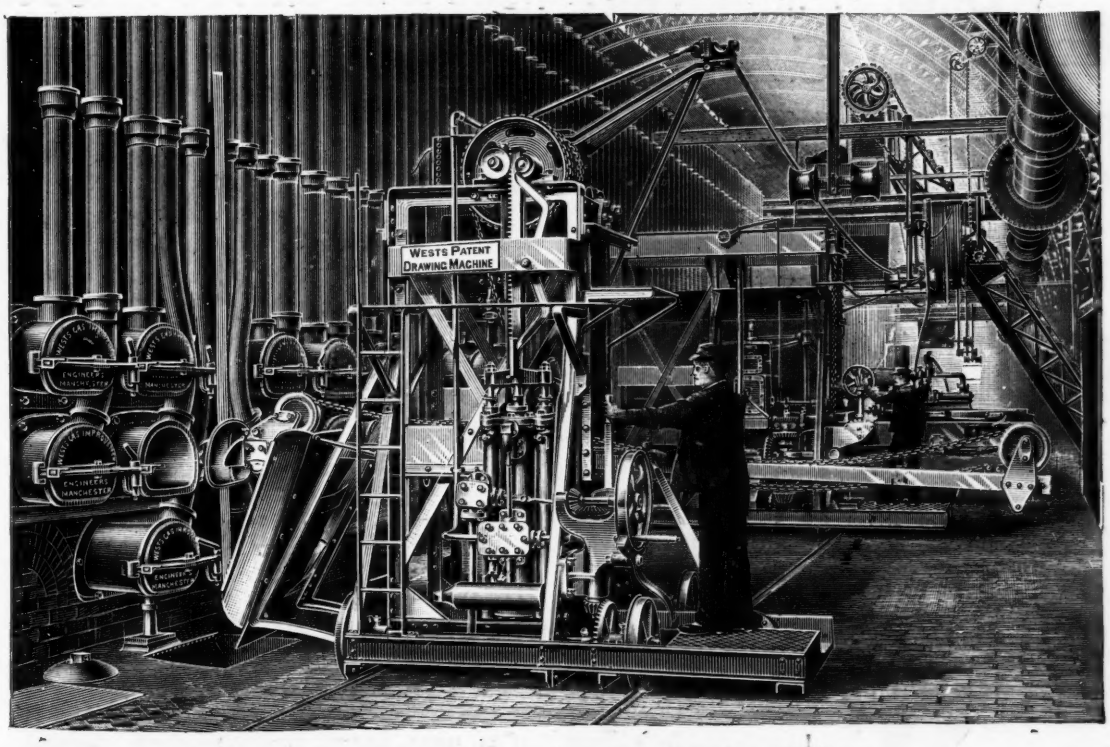

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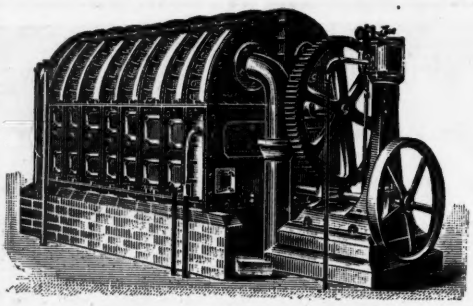

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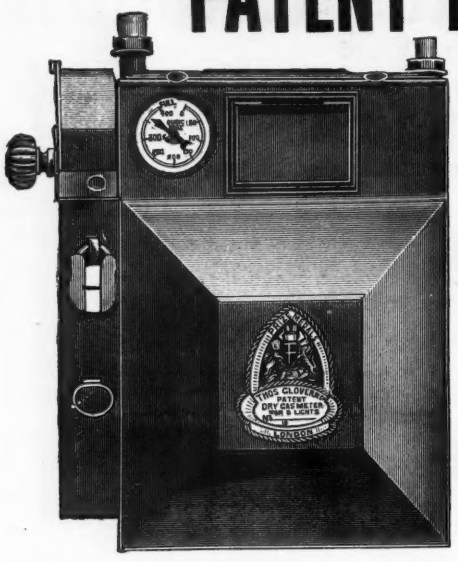

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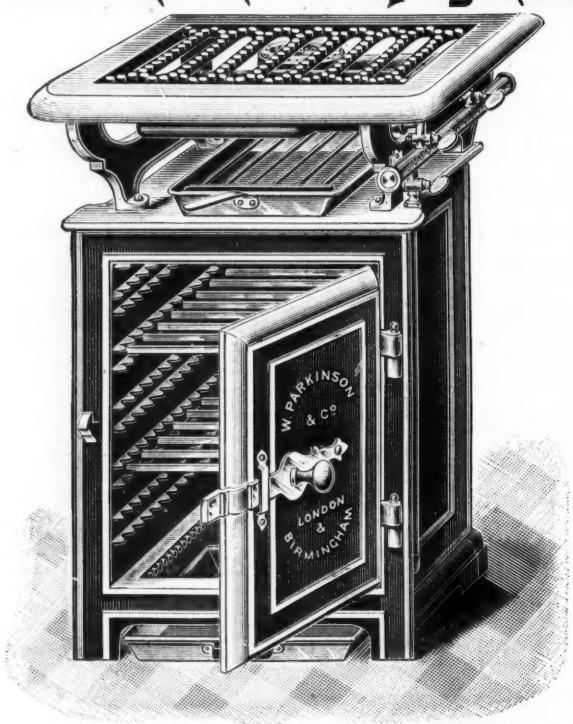

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EDITORIAL NOTES.

The South Metropolitan Meeting—Mr. George Livesey's Jubilee.

THE ordinary general meeting of the South Metropolitan Gas Company on Wednesday last was well attended. Mr. George Livesey, the Chairman of the Company, presided; and the proceedings, both at the ordinary meeting and at the special one which followed, were of the nature of a triumphal procession for himself and his policy. To dispose of the most exceptional part of the business first, it must be recorded that the proposed Workman-Director scheme was carried with two dissentients, after a single speech in opposition which did not advance any new objections to the now familiar idea. An interesting piece of personal confidence was imparted to the meeting by the Chairman at the close of the business. He told his audience that he had just completed his fifty years with the Company, and recognized the triumph of his new labour policy as the crown of this long service. Our readers as a whole will unite with us in tendering sincere congratulations to Mr. Livesey upon his Jubilee in the gas industry, and in the hope that he may yet be spared for many years to continue those services by which he has built up his great reputation.

With regard to the business before the ordinary meeting, the chief point of interest in the Chairman's speech was the skilfully marshalled argument in support of the proposition that a low price and conciliatory treatment of the consumers tells beneficially on the consumption of gas. This proof, of course, rested upon a comparison of the recent history of The Gaslight and Coke and South Metropolitan Companies' dealings with their respective consumers. It is impossible to get away from these comparisons. The Governor of The Gaslight and Coke Company makes them when it suits his purpose to do so; and Mr. Livesey is never slack in "carrying the war into the enemy's country." Whatever may be the nature and outcome of the individual differences between Colonel Makins and Mr. Livesey—and they are neither few nor obscure—the difference between the moral atmosphere (to use a questionable word for the want of a better) of a Chartered and a South Metropolitan general meeting is most noticeable to those who make a practice of attending both. It may be said that shareholders are pretty much alike everywhere in thinking chiefly of their dividends; but the South Metropolitan meetings give a disinterested observer the impression of being sympathetic to other considerations besides the dividend. It is a curious, and from our point of view a deplorable fact, that the possibility, or the actuality, of a rise in the price of gas is often, through force of circumstances, talked about by the Governor of The Gaslight and Coke Company; and the idea always evokes an expression of approval from somebody in the meeting. On the other side of the water, a similar suggestion would be treated as calamitous.

On the present occasion, Mr. Livesey had the upper hand of his brother Chairman in almost every comparative statement. He had a positively larger dividend to recommend. The increase was small, it is true; but it was nevertheless an increase. It was earned by the sale of gas at the lowest price in the history of the gas supply in London; and there was no fear that the dividend or the low selling price would suffer as the result of recent disturbances of the coal trade. There has been plenty of money to spare out of revenue for repairs and renewals; and the Company are able to provide for their extensions at a capital outlay of £255 per million cubic feet of gas sold. The Chartered do it at a cost of £1011 per million. It is, of course, very unkind for those in the gas industry to mention these things. It would be so much nicer for the people immediately concerned if everybody would only hold his tongue, and refrain from remarking unpleasant contrasts! But, unhappily, the day of the sayer of smooth things regardless of the cruel truth is short; and the end thereof is part of the discipline of the world.

We must not pass over Mr. Livesey's argument about the slowness of the increase of the gas consumption in the district of The Gaslight and Coke Company since 1889, without drawing attention to the circumstance, which may or may not be material, that he omitted all mention of the progress of electric lighting, which has been most conspicuous of late years in the best parts of the City and

West-end. We say that this omission may or may not be material, because Colonel Makins once devoted some pains to convincing his proprietary that the progress of electric lighting in "the Bond Street quadrilateral" had not injuriously affected the business of the Company. These observations were made at the Chartered meeting in February, 1892. Since then, it is true, the Governor has complained of the inroad of electric lighting in the central region of London. How does the matter stand now? What are the facts? If the Electric Lighting Companies can be shown to have cut into the Chartered preserves, Mr. Livesey would probably remark that it is largely the fault of the Gas Company. If the Company will not propitiate the large consumers by allowing them a cash discount, while the Electric Light Companies are only too anxious to oblige, may not this have something to do with the loss of trade? If the Administration of the Gas Company permit it to be publicly understood that the favour of the public is nothing to them—that if they cannot make both ends meet they will put up the price of gas without the slightest hesitation, is not this enough to drive the large consumers into the other's arms? Of course, as we have already admitted, these queries are most inconsiderate. The Chartered directorate, however, are not the only public characters who do not shrink from making themselves disagreeable (as the Governor proudly claimed for them at his last meeting), when the occasion appears to demand the sacrifice.

Concerning the extraordinary general meeting of the South Metropolitan Company there is not much to be said. The opposition to the Chairman's proposal, though he did not profess to speak for a united Board, was insignificant. The Workman-Director is now to be tried; and the world will see what comes of it. He can hardly be worse than the nice "clean, tame guinea-pig," of whom something has been heard of late in connection with Company scandals. We do not expect that the South Metropolitan Workmen-Directors will effect much in the way of improving the administration of the Company, or hastening the advent of the industrial millennium when the lion of Capital will quietly lie down with the Labour lamb. The wheels of the progress of humanity go slowly, and are not to be speeded up in this way. But it is possible to do much good without disturbing the stars in their courses. The very fact that a workman is willingly admitted to the Board of a great statutory and industrial undertaking will be acknowledged as a proof of good faith on the part of the magnates of capital who have hitherto monopolized these Olympian heights. No classical legends were more popular than those which described Jupiter, king of gods and men, as willing to admit to the occasional exercise of his power some mortal who fancied himself able to wield the thunderbolts to advantage. The Workman-Director will see how business is done, even when he may feel incapable of controlling it himself. He will be a living refutation of many scandalous myths concerning the ways of Capital that the socialistic prints put into circulation; and, above all, he will see for himself that it is not Labour that is the source of all the wealth of the universe. Certainly, an experiment fraught with such possibilities of interest is worth trying, especially as, under the conditions, it can do no harm.

The North of Ireland Association Meeting.

THAT the North of Ireland Association of Gas Managers has passed through the troubles and weaknesses incident to the earlier years of life, and is now entering upon what, it may be hoped, will be a period of vigorous manhood, is the feeling aroused by the highly successful meeting which was held under the presidency of Mr. J. Nisbet, of Portadown, in that town last Tuesday. The rise of the Association during the past few years has been very rapid. In spite of geographical and other difficulties, the membership has risen to about fifty; and while there are yet many managers in Ireland who, with profit to themselves, might join the ranks, the advance has been so well maintained that there is ground for the belief that, in a few years, all will have been brought in who it would be reasonable to expect should come. Of course, the widening of the sphere of influence has led to an improvement in the quality of the annual gatherings. This year's is acknowledged to have been the best meeting yet held under the auspices of the Association. The policy—a wise one, in the circumstances—is not to aim at high things. The mysteries and subtleties of chemical action, and numerous other subjects which appeal to the engineer of a large works, where a trifling saving per ton amounts to a large sum at the end of the year, need not harass the manager of small works, where the putting in practice of many scientific processes of dealing with the materials handled, would result, not in gain, but in loss. The problems which present themselves in every-day working are more to the point. These are the subjects which create the best discussions in the Association; and they are also the subjects which are most popular with the writers of papers. The President's address, and the papers by Mr. Ross and Mr. Gibb, are examples of how much may be made of the common occurrences of a gas manager's every-day life, without attempting to grapple with heroic questions. It would be incorrect to say that the members of the Association are indifferent to the higher branches of their profession, or have not a thirst for knowledge for its own sake; for one of their customs is to provide a lecture upon a scientific subject, at their annual meetings. No part of the programme is more popular than this; and it was therefore a matter of great regret that this year Professor Ivison Macadam, of Edinburgh, their fastest friend, was unable to be present on account of official duties connected with the Volunteer force, in which he holds the office of Brigade Major. The success of the Association being now, so far as can be foreseen, quite secured, it was fitting that the members should turn their eyes backwards, and, seeing how much has been accomplished, should resolve to recognize the services of their Hon. Secretary, Mr. James Whimster, of Armagh, but for whose devotion to the Association, and energy in promoting its interests, it could not have been expected to stand in the favourable position it now occupies. The experience of the Association in the matter of giving awards for competition papers seems to emphasize the truth that genius cannot be bought or sold. A man who has a subject on his mind will usually bring it forward without the offer of a gold medal. Mr. P. Egan, of Tralee, worked for his medal, and deserves it; but, as the policy has not been a success—and, indeed, does not now seem to be required, there having been actually a plethora of papers at this year's meeting—it might be worth the while of the Association to consider whether they should not, as in some other Associations, present a medal to the President on his retiring from office. Such honours are highly prized in other bodies.

The Portsea Island Gas Company and its Management.

PERHAPS the strangest point in connection with the half-yearly meeting of the Portsea Island Gas Company last Saturday (a report of which appears in another column) was the absence of the least allusion to the strong competition that is now carried on by the Corporation with the electric light. The matter, in fact, was utterly ignored; the shareholders being apparently satisfied with the Company earning continuously sufficient money not only to pay the full statutory dividends, but to carry forward a good round sum. The chief expectation of a protest at the almost compulsory resignation of Mr. S. B. Darwin, after a service as Engineer extending over a long period, was doomed to collapse, after an explanation from the Chairman, who was clear in his statement as to the dissatisfaction of the Directors at the management of the works. Whether Mr. Darwin or the Directors were right in the matter, we do not pretend to determine; but though the Chairman sarcastically hinted at a possible "catastrophe" which had been escaped, it would be interesting to learn whether, by any parsimony, the hands of Mr. Darwin had been tied in any suggested introduction, either in the way of improvements or new machinery. The fact is patent that, after consultation with Mr. Alfred Colson and with Mr. Ashworth—the latter having now been installed as the Company's Engineer—the report bears witness that, in order to put the works into a thorough state of efficiency, some £2000 will have to be spent. Let the fault lie where it may, we feel the utmost sympathy with Mr. Darwin, who has spent the chief years of his life in a service which has at length turned upon him; and though, as the Chairman said, he might have been taking a liberal salary, we cannot help feeling that so wealthy a Company might have behaved generously in the way of granting a parting bonus or a continued pension.

An Important Definition of the Law of Main Laying.

AN important appeal case dealing with a common question concerning gas and water mains was decided on Monday

of last week, as reported in our "Legal Intelligence." It was an action brought by the Southwark and Vauxhall Water Company against the Wandsworth District Board of Works, in the first instance in the form of a motion before Mr. Justice Kekewich for an interim injunction to restrain the defendants from so lowering their streets and footways as to leave the plaintiffs' mains without sufficient covering to protect them from injury, unless they (the defendants) first lowered such mains to the same depth as before at their own expense. His Lordship was of opinion that there was reason for the issue of an injunction to restrain the defendants from injuriously altering the position of the mains relatively to the road surface, rather than leave the plaintiffs to sue for damages in the event of any actual injury being sustained.

The case as presented to the Court turned upon the construction to be put upon section 98 of the Metropolis Local Management Act, 1855, which says that it shall be lawful for a Highway Authority to raise or lower the ground of any street, or to alter the position of any mains, subject to the approval of the Engineer of the Company to whom the mains belong. In this instance, the latter part of the clause does not apply, inasmuch as the Authorities did not disturb the plaintiffs' pipes. This circumstance is held by the Court of Appeal to distinguish the case from that of *The Gaslight and Coke Company v. Vestry of St. Mary Abbotts*—the leading steam-roller and gas-pipe case. The great case of *Geddis v. Proprietors of the Bann Reservoir* is also held not to apply. The Master of the Rolls pointed out in his judgment that the section of the Act already mentioned must be shown to put upon the defendants the duty of lowering the plaintiffs' pipes, though they did not want to do so for their own purposes. The assumption underlying the plaintiffs' action is that they are entitled to have a certain depth of soil covering them. For this assumption there is no legal warrant. It is admitted that the wording of the Metropolis Management Act is not clear; but the Master of the Rolls had no difficulty in reversing the judgment of the Court below upon the main issue. Lord Justice Chitty concurred; observing that the real question was who was to pay for altering the position of gas or water pipes when the level of any street is changed for public reasons. This is for the owners of the pipes, who are responsible for placing them at a proper depth. Lord Justice Collins took the same view. It is satisfactory to have the law of this important question defined so clearly and strongly. The decision leaves open the other question, which did not arise in this instance, of whether, supposing the Highway Authorities to have desired to alter the actual position of the pipes, they would have had to do it at their own expense as well as submit the new location to the Company's Engineer.

Tenders Wanted!

A CORRESPONDENT has drawn our attention to the terms of an advertisement published in a provincial newspaper, which runs as follows: "Wanted, Manager for —— Gas-"Light Company.—The Directors will at an early date "consider Tenders for the position of Manager of Gas-"Works. Salary not to exceed £50 per annum; free "house, gas, and coal; lowest or any tender not neces-"sarily accepted.—Tenders to be addressed, the Secretary." This is certainly the finest example of the kind of thing that has ever come under our notice. Many branches of trade go to the supplying of gas-works necessaries; but who keeps "managers" in stock ready for placing out by "tender"? What a magnificent position is here offered for competitive applications! The idea of naming a maximum salary, with the suggestion that those who are willing to accept the post for less will have the better chance, although the "lowest or any tender" will "not "necessarily be accepted," is distinctly new. There ought not to be any difficulty in procuring recruits for the noble army of gas managers in a land where the profession is so well paid. Manager! Who or what is the gentleman to manage for this splendid *solatium?* Does the works staff consist of a boy, with perhaps a yard dog? Many a man would hesitate to undertake to "manage" himself alone, to say nothing of his household, for this amount. Truly, it takes all sorts of people to make a world. What with Hooleyism in the high places of the industrial community, and gas managing at something less than £50 a year at the bottom, who shall contend any further that the present organization of the community upon an individualistic basis is in need of justification?

The Cost of the Engineering Strike.

IN the "Daily News" of last Friday there appeared a critical notice of the official report of the Executive of the Amalgamated Society of Engineers, and the balance-sheet of the great engineers' strike of last year. Of course, the statement is not complete. The expenses of the Society in connection with the strike are spread over two years, and the total cost of the dispute to other Trade Unions must be sought in their respective accounts. This particular balance-sheet embraces only the funds subscribed by the "public" to aid the strikers, the term meaning all sources outside the A.S.E. and allied trade organizations. The total amount was £181,000, of which £52,800 was raised by local Strike Committees, and the remainder was sent direct to headquarters. Considerably more than half of this, or £69,380, came from "Trade and Labour Councils and "Trade Societies and Parliamentary Committee," and can hardly be styled a contribution from the "public." The same remark applies to £28,399 entered as "subscriptions "from abroad"—mostly from foreigners profiting by the interruption of British trade. There is a great drop to the next entry—"Newspaper readers, £4795;" which may be taken as a true indication of the intensity with which the "great "heart of the public" beat in sympathy with the strikers. "Shop and job collections" only turned in £1182—not a strong testimony to the popularity of the movement even among professed Trade Unionist workmen. It is remarked that this total sum of £115,872 "is a record in public "contributions to a labour struggle." The claim is misleading. The public support of the strikers properly so-called did not translate itself into £10,000 of hard cash, all told; and there has never been a strike of colliers which did not attract more public money to the help of the men and their families. These figures really show that sympathy for the engineering strikers did not exist outside Trade Union circles, and was not of much value there.

Even with the additional figures, the "Daily News" confesses that "it is impossible to arrive at the precise cost "of the dispute to the men engaged." Such inquiry as is possible, however, brings out at £4,680,000 the approximate financial cost of the struggle to the men. And what was it all about? It appears that the Secretary of the A.S.E., Mr. Barnes, finding himself quite as strong as ever in his official position, ventures to play the part of Old Kaspar in the ballad in discussing the "famous "victory." He admits that the immediate cause of the outbreak of hostilities was the demand for an eight-hour day for the London trade; but this was only the precipitation of trouble that had long been in preparation. The Trade Unions had been growing in strength, and were conscious of it. To those well-meaning amateurs of Trade Unionism, in Parliament and elsewhere, who have accepted the now very familiar claim of professional labour leaders that strong Unions make for industrial peace, we commend Mr. Barnes's candid confessions in this regard. While naturally declining to agree that trade organization in itself constitutes a danger, or contributes to the rupture of peace, he declares that "there was unfortunately a desire "on the part of many to use the weapons thus forged as "means whereby complete mastery might be obtained." This gives away the whole case, as against the employers. But Mr. Barnes says even more. He, being very busy at headquarters, of course had nothing whatever to do with the sporadic shop disputes that troubled the engineering trade all over the kingdom. But he is willing to confess, now it is all over, that, "under cover of membership and "even officership of the Unions, many frivolous claims "had been made." It took months of trouble and the squandering of vast sums of money to teach the A.S.E. that they were on the wrong tack in allowing Trade Unionism to be identified with this irritating behaviour on the part of the Society men, and in accepting battle with the employers on a particular ground—the demand for eight hours—where other Trade Societies would not support them. Mr. Barnes is very outspoken also respecting the way in which this latter discovery was made. When the strength of the A.S.E. was found to be failing before the stubborn resistance of the employers, the London Trades Council convened a meeting, which took place in the Farringdon Street Memorial Hall, and was attended by the representatives of more than 112 Trade Unions and Councils. "The meeting was one of great enthusiasm; "and much was expected from it. But the outcome was "disappointing, as, instead of increased support, there was

"a decided falling off in voluntary subscription." Nothing could be more damnatory of the egregious pretensions of the wirepullers of the London Trades Council than this simple story of an anti-climax. Mr. Barnes' statement confirms the prevailing impression that the great engineering strike was like a thunderstorm—clearing the air of the workaday world of much oppressive vapour and unendurable sultriness.

It may be worth mentioning that the questions of the expediency of the strike, and the justification for its support by other trade organizations, are to be mooted at the forthcoming Trade Union Congress, which is this year to be held at Bristol. It is impossible to say whether the discussion will really come to anything—probably not, as these congresses are mainly gatherings where people indulge in a great deal of purposeless talk. But if the raising of these questions at the Congress means that the rank and file of Trade Unionists are dissatisfied with the system of autocratic society management, under which the strike was ordered and subsidized by officials who could not suffer by it in any event, the sign may be a hopeful one.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 391.)

BUSINESS in the Stock Exchange was very quiet last week, as might be expected at this time of year, and in fine hot weather. The general course of movements was rather irregular; flatness and firmness alternating, and being pretty evenly matched in the tug of war over prices. Affairs in the Far East were, of course, depressing enough as they went from bad to worse; while the progress of Spanish peace negotiations exercised an opposite influence. The American market had the best of it; being very firm. The settlement went through without any disturbing element. The requirements had no effect on the enormous supplies in the Money Market; and discount rates have fallen easier during the week. Business in the Gas Market was at a very low ebb; and transactions were wholly devoid of interest. Quotations remained quite unaffected until the close of the account, when a large number were quoted *ex div.* Almost all these changes were more or less in the upward direction; evidencing a favourable tendency, if there were only sufficient business to bring it into action. Gaslight "A" was not a gainer in this respect, being lowered 7 points for an actual loss of $6\frac{1}{8}$; but the excess is only fractional. Business done in it was very steady all the week. The secured issues profited considerably by the *ex div.* changes—especially "B" and "G." Very little business was done in them. South Metropolitan was fairly brisk considering; and the price was good, while the debenture advanced a point. Commercials were steady and unchanged. The Suburban and Provincial Companies were as quiet as they well could be; but several of them are better on *ex div.* changes. The Continental undertakings were extremely inactive, and made no sign of a move. Among the rest, San Paulo and Oriental receded; the latter owing to a larger number of shares having suddenly come on the market in the quiet season than could be readily absorbed. Dealings in Water were very limited. Kent had a big rise, in consequence of the higher dividend.

The daily operations were: The Gas Market opened very inanimate on Monday. The only change was a fall of $\frac{1}{2}$ in San Paulo. Things were just as restricted on Tuesday, and nothing moved. Wednesday was a repetition of the preceding day. Thursday was a little improvement in point of activity. Oriental, £1 paid, fell $\frac{1}{4}$. Friday was a busier day; and a large number of quotations were marked *ex. div.*, as detailed in our list. Oriental fully paid fell $\frac{1}{4}$. In Water, East London receded 2. Business was quite quiet on Saturday, and quotations closed unchanged.

ELECTRIC LIGHTING MEMORANDA.

A Presumed Master-Patent for the Alternating System—The Prospect of Litigation—The Warning of Hastings.

MENTION was made in our "Electric Lighting Notes" last week of certain threatened litigation which was supposed to be seriously disturbing the owners of electricity works employing the system of alternating currents. The very mention of the term "master-patent" is enough to send cold shivers down the back of many a works manager; and the presumption that the whole business of alternating current electricity supply is controlled by such a patent, is one that must arrest attention outside electric lighting circles. This is the presumption raised by the reported action of Mr. Martin Rucker, in serving notices upon a number of municipal electric lighting authorities using the alternating system, to the effect that such user is an infringement of the Zipernowski-Deri patent owned by him, and claiming damages therefor. It may be considered a remarkable thing that the existence of this pretended master-patent is only now being made known; but there is nothing in this to invalidate the patent, supposing it to be of any validity at all. The only consideration worth discussing in this connection is as to the character of the *primâ facie* case set up by Mr. Rucker.

The Zipernowski-Deri patent in question is one which was granted in 1885 to a Patent Agent, Mr. W. P. Thompson, on a communication from the inventors, at Buda-Pesth, relating to "improvements in the method of distributing electricity." The names of the patentees are familiar in the electrical world; but nothing seems to have been done with this particular patent, until it came in November last into the possession of Mr. Rucker. Then steps were taken to amend the final specification; and, this being done, notices alleging infringement followed. Claims were made for past unauthorized usage of the invention, and it was also intimated that the user must be discontinued until a licence had been obtained. In one or two cases, it is reported, arrangements have been concluded for the unrestricted use of the patent—which is just what the holder wanted, to give his claims the appearance of actuality. It is also stated that an action has been commenced against the London Electric Supply Corporation—this being the test case. The recipients of Mr. Rucker's notices have, however, joined forces and appointed a Defence Committee, who will contest the claims to the last. It is not for us to say whether or not Mr. Rucker's proceedings are justified in law. It is obvious that if he only acquired last November property in a patent which expires next year—assuming that it has been kept alive—he could not possibly recover much, even in the event of the Courts deciding in his favour. Probably the whole affair was only meant to flutter the electric lighting share market.

The perfervid advocates of the municipalization of electricity supply for the sake of the "principle" have numerous very awkward examples to deal with before they can claim that what they assert to be the right way of supplying electricity is always expedient also. One could understand a "Progressive" local politician upholding the principle of municipalization without regard to the sordid consideration of profit and loss. That is one view of the subject; and it is a respectable opinion for which there is a good deal to be said. Unfortunately for themselves, however, those who maintain the principle invariably commit themselves to the further proposition that it is expedient for electricity supply to be municipalized in the ratepayers' interest; and this is where their case breaks down. There are not half-a-dozen municipal electric lighting undertakings in the country which truly benefit the ratepayers as such; but a highly instructive illustration of how the ratepayers of a town may suffer from their representatives' dabbling in electric lighting is supplied by the Hastings Corporation. The Hastings and St. Leonard's Electric Light Company have always enjoyed the favour of the Corporation; but they could never get their share capital subscribed. They built their works and carried on their business with borrowed money, like other concerns of the kind that could be named. Under this depressing condition, the Company did a certain amount of private lighting, and obtained a contract for lighting the sea-front of the two towns with arc lamps at £25 each per annum, by which they lost £800 a year. Then it occurred to someone that the Corporation ought to buy up the undertaking by agreement—a suggestion with which the Company cordially agreed. A bargain was made between the Town Council and the Company to purchase the property for £54,200; but an agitation arose in the town, and at the next municipal elections the party of purchase were defeated. Still, the new Council found themselves tied by the provisional arrangement made by their predecessors; and it was only possible to obtain a revision of the terms when the matter came before the Local Government Board. At the inquiry, a strong, and successful, effort was made to have an independent valuation by a really competent engineer; and Professor Henry Robinson was appointed to do the work for the Corporation, with the net result that he finds the property to be worth at most £40,000. His report is published in full in the "Hastings and St. Leonards Weekly Mail" for the 6th inst.

A New Griffin Gas-Engine.—The progress of the competition of gas-power isolated electric lighting with the central station supplies is illustrated by a contract recently fulfilled by the Griffin Engineering Company. As described in "Engineering," this warehouse plant consists of two pairs of gas-engines of entirely novel construction, driving dynamos connected interchangeably. The cost for gas and lubrication is stated to be less than $1\frac{1}{2}$d. per unit; and the owners find that the arrangement is much more economical than taking their supply from the mains. The motors depart very far from the usual design of a gas-engine. The most striking peculiarity is that the motor is vertical; the cylinders being supported on four massive steel pillars. Small vertical gas-engines have been made before; but those under notice are claimed to be the largest yet constructed of this type—each engine giving 40 brake horse power. The cylinders are in pairs, with a single connecting-rod; and the engine works on the four-stroke cycle, there being an explosion for each stroke in one or other of the cylinders. The engines are constructed under the patents of Mr. S. Griffin. The gas consumption is stated to be 21·5 cubic feet per brake horse power per hour.

"NEWBIGGING'S HANDBOOK." *

THE publication of another edition of Newbigging's Handbook is an event for English-speaking gas engineers, works' managers, and students of the industry of gas manufacture. It would be difficult to overrate the service rendered to members of the gas engineering profession at large by Mr. Newbigging in providing what, without flattery, may be described as one of the very best technical handbooks that ever issued from the press. From the appearance of the first edition of this manual, it was recognized as being just the book needed by practical gas managers to help them to systematize their work according to sound rules vouched for by competent authority. Every succeeding edition has been a new book, prepared as a labour of love by the painstaking author, who has spared no effort to keep his work abreast of modern practice, and has always put into it the best that he had of technical knowledge and the fruits of long and deep experience. The relations that have existed for so long between Mr. Newbigging and the "JOURNAL" must not prevent us from treating the new edition of the famous "Handbook" precisely as we should treat a work of similar character and importance by a strange writer; and we accordingly propose to inform our readers of the nature of the contents of the book, although few followers of the industry will need our recommendation to procure a copy of this indispensable manual.

As the title-page informs us, the present is the "Centenary Edition" of the "Handbook." A good deal has been said within the last year or two of the Murdoch Centenary; and quite enough has been done by way of keeping green the memory of the originator of gas lighting. Mr. Newbigging has rounded off this celebration by giving a fine steel portrait of William Murdoch as a frontispiece to his new edition, and laying stress, in his "Introduction," upon the fact that the first actual gas lighting on record was effected by Murdoch in 1797-8. The "Introduction" itself is a succinct account of the development of what the author styles "the art of coal-gas manufacture" from its origin to the newest phases. Immediately after this essay occurs the first notable alteration in the scheme of the "Handbook." Most of the records of coal tests that filled several pages of former editions have been left out to make room for other and fresher matter. Enough, however, is left to satisfy ordinary requirements. The storing and testing of gas coals are fully discussed with reference to practical considerations. Under the heading "Gas Production," the student is prepared to appreciate the importance of the work of the retort-house by the emphatic warning that "any want of economy here (and the word 'economy' implies efficient apparatus, proper conditions of working, and good management generally), cannot be compensated for in any of the subsequent processes or stages to which the gas has to be subjected, or through which it has to pass before it reaches the consumer."

In describing the design of the retort-house, the author states that "the ground-floor house is the most usual form." While this statement is strictly true, having regard to the total number of retort-houses, old and new, existing in the country, it is likely to mislead if read as meaning that "most usual" is tantamount in this connection to "most suitable for general use." Later on the author commends semi-stage, and stage retort-houses; but it might be objected that hardly enough stress is laid upon the tendency of contemporary practice in this regard. The expediency of reducing the amount of hand labour in carbonizing is, of course, the key to modern retort-house construction; but this is left to be inferred from the detailed descriptions of different types of retort-houses given, and is not laid down as a guiding principle. It is noteworthy that Mr. Newbigging commits himself to the observation that "the advantages of the inclined or sloping retorts are so manifest and great that their universal adoption is only a question of time." He is to be congratulated upon the candour of this judgment.

Curiously enough, the author, while describing retort-settings and giving valuable hints upon the subject, does not explain a setting of retorts with regard to the distribution of the heat from the furnace by means of flues, chambers, or radiation. This is a point of which old gas managers used to make a great deal; but it is now commonly left to the specialists in gaseous firing and regenerative retort-setting construction. It is difficult for the writer of a technical manual to handle a branch of his subject which has been so highly specialized as this, without appearing to slight somebody or to lend undue advertisement to somebody else. Mr. Newbigging has elected to run the former risk; and he is not to be blamed for this exercise of caution, though he would have been thanked by some inquirers if he had told where more particular information respecting the most popular systems of retort-settings might be sought for.

Mr. Newbigging writes in favour of "through" horizontal retorts, as compared with either single retorts or long retorts with a central partition. If his prophecy respecting the eventual triumph of inclined retorts is justified, this point will become of merely historical interest. For the time being, however, it possesses considerable practical importance in the estimation of numbers of gas managers. Whatever may be the advantages of the through retort with open ends—and these can be reduced to facility of scurfing and perhaps of drawing—they certainly have the drawbacks that it is not easy to ensure the deposit of a proper depth of charge in the middle, where the scoops meet, nor that the two ascension-pipes shall function equally. Mr. Newbigging goes into an interesting discussion of the latter question, in connection with the determination of the temperature of the gas as it leaves the coal. We may be sure that he would be the last man in the profession to pose as capable of saying the final word upon any moot question of gas-works practice; and some of his statements respecting this and other debatable topics are obviously meant to be suggestive, and stimulating of further research, rather than dogmatic.

The condensing of gas is described; and this leads up to the study of the exhauster and its motive power. It is the author's plan to go through the works stage by stage, dealing with all the plant and accessories as he finds them by the way. Thus, in connection with condensation, we learn about the conversion of the degrees of one thermometric scale into another. Similarly, under the heading of "The Exhauster," we find data concerning the power and performance of steam-engines and boilers. The capacity of water for absorbing gases occurs in the chapter on washing and scrubbing. By the way, has anybody ever distinguished authoritatively between what is meant by "scrubbing" and "washing" gas? It is hardly necessary to remark that "Purification" is seriously treated.

Gasholders and their tanks have always received particular attention from Mr. Newbigging; and they occupy many pages of the present edition of the "Handbook." It is difficult to conceive that any engineer contemplating the design of a works of this kind should wish for any fuller information respecting executed examples than is to be found here. The same remark applies to the author's treatment of gas-distributing appliances. Mr. Newbigging has a liking for turned and bored cast-iron gas-mains, with a recess in front for filling with lead or cement; this form of joint being in his opinion the most perfect possible. Very pertinently, he objects to coating gas-mains internally with any material soluble in a fluid hydrocarbon. It may, however, be doubted whether it is altogether wise to lay uncoated gas-pipes in any soil, as the sourness and dirt that mark the ancient gas-pipe give rise to serious nuisance when the main is uncovered for any purpose. The author's treatment of the subject of service-pipes and meters is as thorough as anything in the book. To show how completely the new edition has been brought up to date, it may be mentioned that Mr. A. Vernon Harcourt's new 10-candle standard pentane lamp is described and illustrated.

The part of the book in which the master-hand of the Consulting Engineer is most conspicuously shown is that in which the gas industry is discussed with reference to the elements of undertakings. Anybody can put together a "text-book" by the simple, if laborious, method of copying data and tables from various sources of information previously open to the curious inquirer. This is also the way in which many of the so-called "technical journals" are got up by painstaking newspaper men who know no more about technical matters than the man in the moon, but are dab-hands at scribbling small personalities, and using scissors and paste. Mr. Newbigging, however, does know all that is worth setting down in regard to the elements of the business of gas supply. He knows it all at first hand; and he tells what he knows without reserve—pouring out with the utmost candour the resources of a well-stored mind and the gains of a great experience. One would look in vain elsewhere for such information as he is able to give here concerning co-efficients of cost, capacity, and so forth, of gas-works plant.

It would be easier, however, to say what is not in this new edition of the "Handbook" than to state what is to be found in it—with reference, that is, to the requirements of the gas engineer and the works' manager. There is, at any rate, no "padding" in it, from cover to cover. The book is provided with an excellent index; and it can be easily believed that nothing at the author's command has been spared to make it as complete and trustworthy as possible in every particular. We could, of course, pick out of it some expressions of opinion on points of practice in regard to which half-a-dozen gas managers might betray as many different minds; but this only goes to prove that the eminent author has not been afraid to stamp his individuality upon his book. On the other hand, he has deliberately refrained from expressing his own predilections where a little criticism might have been instructive, but might also have been open to misconstruction. He is no "quack," with a cut-and-dried remedy for all the troubles of the gas manager at home or abroad. The "Handbook" is not meant for a "crib" to help students to cram for the examination in "Gas Manufacture" of the City and Guilds of London Institute; nor will it be found of much comfort to the interloper who takes on the management of a small gas-works to the exclusion of the properly trained professional. But to the busy engineer or manager, or the honest student, it will prove a friend to remind him of facts and figures which are apt to escape the memory when they are most wanted.

* "Handbook for Gas Engineers and Managers." By Thomas Newbigging. Sixth (and Centenary) Edition, Illustrated. London: Walter King; 1898.

Mr. GEORGE SMITH, the Chairman of the Kent Water Company, died very suddenly from heart failure on the 9th inst., as he was preparing for the half-yearly meeting of the Company. He had been a Director for more than fifty years.

THE ACETYLENE EXHIBITS AT THE IMPERIAL INSTITUTE.

(*Concluded from p.* 301.)

The Abingdon Acetylene Illuminating Company, Limited, make acetylene generators according to the scheme devised by Mr. R. J. Moss, and protected under letters patent No. 1254 of 1897. The abstract of this patent specification, given with an illustration in our "Register of Patents," Vol. LXX., p. 1346, provides a good description of the "Abingdon" generator. The vendors point out that the apparatus—which is of the dip type—is free from bent tubes, manholes, and screw-down valves. The gas is well cooled before it passes out of the burners; and if the after-make is sufficiently under control—a troublesome matter with generators of the dip type—the apparatus seems to be well adapted to fulfil its purpose properly.

The Acetylite Syndicate make an apparatus of the automatic class, in which granulated carbide drops from a reservoir placed n the crown of the bell of a gasholder into the water in the tank of the holder. The rate of feed of the carbide is controlled by a conical distributing valve at the narrowed base of the reservoir. When the bell descends, the valve is lifted by means of a weighted vertical rod which strikes a plate placed in the tank. The apparatus is almost the only representative at the exhibition of a class of which much was expected at one time, but which has signally failed to come to the front. Theoretical considerations lead to the conclusion that it is preferable to add carbide to water than water to carbide; but great difficulties supervene when it is attempted to make the addition of carbide to water an automatic process controlled by the rate of consumption of the gas. The carbide must be powdered or granulated, in order that it may pass through a comparatively small orifice without risk of jamming therein. If the carbide is not thus prepared, very complicated feeding-devices are required, and considerable gas-storage space is necessary. The complications alone, or the jamming of the carbide in a valve, sooner or later almost invariably are the undoing of well-conceived generators of this class. We understand that the Acetylite Syndicate have found it convenient to adopt several modifications of their original apparatus; but they have adhered to the principle of adding the carbide to the water. We wish them every success in their laudable attempts to perfect a generator working automatically on these lines, especially as many inventors who at one time made similar efforts have desisted in despair. The generators of the pattern exhibited by the Syndicate have been freely adopted in France; and therefore there have been many opportunities for ascertaining from actual experience the most necessary improvements.

Other exhibits of much interest are those of Pintsch's Patent Lighting Company and of Messrs. Ehrich and Graetz. Messrs. Pintsch have a generator of very different appearance outwardly from the Pictet generator already described (*ante*, p. 251), but in principle resembling it. The acetylene made by this firm is employed in a number of railway carriage lamps of the customary pattern for the consumption of oil gas. At the time of our last visit to this exhibit, the burners were suffering badly from the deposited carbon; and we are convinced that no traveller would prefer acetylene consumed under such conditions to the usually well-behaved oil gas, for the illumination of the carriage in which he journeyed. Improved burners of small size must be forthcoming before undiluted acetylene can compete successfully with oil gas for the lighting of railway trains. Messrs. Ehrich and Graetz have a generator from which they serve two cluster lamps enclosed by globes of the arc-light pattern. These lamps are in a draughty position, but seem little affected by the air-currents. They have a pleasing effect.

We have now reviewed the more important features of characteristic exhibits. It has been our unpleasant duty in many cases to find fault with the generators on which some inventors have pinned their faith; and our criticisms of their schemes may occasionally have appeared to be unnecessarily severe. But throughout we have kept in view the advantage of the industry at large. The acetylene industry bids fair to become of considerable importance; and nothing is so likely to nip its growth in the bud as the sale of defective generators and the dissemination of erroneous ideas concerning acetylene. We have it on very good authority that the manufacturers who are exhibiting at the Imperial Institute have now at their command, ready to be devoted to the production of acetylene generators, between three and four millions sterling. This sum is exclusive of the capital invested in the carbide industry. Its amount indicates that many capitalists are sanguine that acetylene has considerable scope as an illuminant. We have held this view since the period when the production of acetylene on a large scale became a possibility; and we have from time to time repeated it when indicating the most hopeful outlets for the new gas. It may not be inopportune, however, to point out now the spheres in which acetylene is most likely to find application; and the effect which its adoption will probably have on the use of other illuminants.

The largest field of employment for acetylene gas would undoubtedly have been as an agent for the enrichment of coal gas and water gas; and it was only after Professor Vivian B. Lewes and Dr. Love had published the results of their careful experiments on the enriching value of acetylene,* that manufacturers of calcium carbide and of acetylene generators gave up hopes of supplying gas undertakings with their goods, and began to concentrate their attention on other applications of acetylene. An enrichment of about 1 candle for every 1 per cent. of acetylene added to coal gas was too poor a return to induce gas engineers to employ it as an enriching agent, when at the lowest estimate it would cost 25s. per 1000 cubic feet merely for the carbide required. Though there is no immediate prospect of carbide being obtainable at much lower prices than hitherto, it is rumoured that quite recently some researches have been undertaken at a large gas-works, with a view to ascertaining if the earlier results of enrichment with acetylene are confirmed when the trials are made on a larger scale. There seems little doubt, however, that there will be no extensive employment of acetylene for enriching ordinary gas supplies.

A more promising opening for acetylene lies in its utilization for increasing the illuminating value of oil gas or even of coal gas for the lighting of railway carriages. The richer the gas to which the acetylene is added, the greater—broadly speaking—will be its enriching value, and therefore the more economical will its employment prove. Moreover, acetylene does not, like oil gas, deteriorate on compression; and so that portion of the illuminating value of a mixture of oil gas and acetylene which is due to the acetylene, is absolutely unaffected when the gas is subjected to compression for storage on railway trains. It has been shown by the exhaustive experiments carried out at Messrs. Pintsch's works at Berlin, by Herr Gerdes and others † that mixtures of oil gas or coal gas and acetylene of which the acetylene does not form more than 30 per cent. of the total volume, may be safely compressed and employed for railway carriage lighting. We understand that extensive developments in the utilization of such mixtures for this purpose are even now in progress.

The use of acetylene which the majority of the makers of generators now regard as the mainstay of their trade, is the lighting of isolated buildings and villages. In very few cases would an installation for lighting by acetylene be required for country mansions not already lighted by electricity. The difference in the initial expense of installing electric light and of installing acetylene apparatus, would not weigh with the owner of a magnificent country residence; and if he decided to adopt either of these modern illuminants, his choice would certainly be electricity, which just at present is the pet of the wealthy classes. The country houses at which acetylene may be employed are those smaller ones which cannot properly be termed mansions, and of which the owners would consider electric lighting an expensive luxury. If such houses be remote from a supply of coal gas, acetylene may prove an acceptable substitute for oil. In the same manner, villages and institutions which cannot obtain a cheap supply of coal or oil for the manufacture of illuminating gas may find acetylene a convenient illuminant. Wherever the means of transport are difficult and costly, acetylene lighting should succeed; since, weight for weight or bulk for bulk, carbide is probably the most compact store of illuminating power at present known to us, though petroleum would not appear much more bulky were it credited with its maximum illuminating value. The freight on carbide in this country is, however, at present excessively high, owing to the fact that carriers insist on regarding it as an explosive. We understand that about £5 per ton is charged by the railway companies for the carriage of carbide from Foyers to London. This heavy charge lays an immense burden on the acetylene industry; but its mitigation may be looked for at an early date. As a competitor with coal gas, where a supply of the latter is to hand, we think there is virtually no scope for acetylene. Even if carbide were delivered at 2d. per lb.—at present small quantities fetch double this price—it would only apparently be on equal terms with 16-candle coal gas at 3s. 6d. per 1000 cubic feet, if the latter were burnt in open-flame burners. We have taken no account of the cost of generating the acetylene, though most people would gladly pay one-third more for gas in order that the manufacture, with its attendant worries and responsibilities, might be carried out on premises other than their own. The cost of manufacturing acetylene from carbide must not actually be regarded as negligible.

We think therefore that acetylene will not affect the better class of work which now comes into the hands of contractors for electric lighting installations in country places. Still less will it affect the gas industry. Where a coal gas supply is established, no rival can at present hope to offer illumination at an equally low price, provided the gas consumer is prevailed upon to adopt burners of modern type. The incandescent burners of Bandsept and Kern give a duty of at least 25 candles per cubic foot of gas consumed, which is very little short of the illuminating power which is in practice obtained from a cubic foot of acetylene. And if it is urged that incandescent gas-burners need attention, and entail expense for the renewal of mantles, it may *per contra* be said that acetylene burners need cleaning and renewing at intervals. With regard also to contamination of the atmosphere, acetylene has nothing in its favour when compared with rationally consumed coal gas. The coal gas will, indeed, give less carbonic acid and less heat per unit of light

* See "JOURNAL," Vol. LXV., p. 1067; and Vol. LXVI., p. 339. *Ibid.*, Vol. LXIX., pp. 652, 1247.

developed; and any harmful effects from sulphur compounds in coal gas will be more than counterbalanced by the products of combustion of the phosphuretted hydrogen and the other impurities in acetylene. Briefly the case for acetylene as a competitor with coal gas at (say) 5s. per 1000 cubic feet is that its cost delivered into the consumer's services must not exceed 7s. 6d. per 1000 cubic feet. Therefore acetylene will not at present prejudicially affect the gas industry. The illuminant which acetylene will replace, in most instances where it is adopted, is mineral oil. It is unnecessary to refer here to the low cost of illumination by means of petroleum oils; for gas engineers are only too familiar with the severity of the competition which their cheapness produces. Probably most manufacturers of acetylene plant will admit forthwith that they do not hope to displace petroleum lamps by offering a cheaper illumination. It is thus a question whether the greater convenience and cleanliness of acetylene will be sufficient inducement to the owners of country houses and the managers of institutions to give up mineral oil lamps in its favour. We think the advantages which acetylene has, in common with coal gas, over oil lighting will cause it to be preferred to oil in very many cases. The extent to which it is adopted will, however, affect but little the amount of oil consumed in this country. In a few instances, also, acetylene may reduce the number of candles used for lighting. If the employment of mixtures of acetylene and oil gas for the lighting of railway carriages, buoys, &c., in place of simple oil gas becomes as extensive as many authorities anticipate, there is no doubt the amount of oil gas made for compression will be considerably reduced.

In houses, therefore, which cannot easily be supplied with coal gas, and for which electricity is too expensive a luxury, there is a fair field for the use of acetylene; and we are glad to observe that in a large number of cases it has already been adopted. Many of the exhibitors at the Imperial Institute testify that they have numerous orders in hand for the supplying of generators to country houses. The exhibition would thus appear to have served well one of its chief objects; but we are disposed to consider that both the exhibitors and the public have received more benefit from it indirectly than directly. There is scarcely one manufacturer of generators who will not have modified his apparatus in some respect owing to the lessons the exhibition will have taught him. Many of the generators which have been examined by the Inspecting Committee, and allowed to be exhibited, are comparatively crude and inefficient appliances; but their makers are now able to produce much more satisfactory machines. It may, therefore, appear a hardship to many of the exhibitors that the report on the tests made under the supervision of Professor Vivian B. Lewes and Mr. Boverton Redwood should embody results relating to apparatus such as they no longer purpose manufacturing. We hope, however, that the authorities will see their way to issue a full and complete report of the tests, even at the risk of inflicting an occasional hardship. The invaluable information collected must not be withheld from publication for the sake of the business interests of a few. The interests of the industry at large demand that the report which the authorities have promised shall give every possible information concerning the working of the various generators. We shall be grievously disappointed—and we believe that the acetylene industry will suffer—if the report is less complete than it might be. We are led to make these remarks because we learn that some of the exhibitors are very anxious that details should be omitted from the report. If the Managing Committee give way to the representations of these exhibitors, suspicion will be cast forthwith on the authority of the report. Moreover, it will be difficult to prevent some details being made known by exhibitors; and it would be far better therefore that everything should be officially published than that unreliable and imperfect data should appear from other sources.

There is still time for those who have not yet visited the exhibition to see it before it closes, on or about the 15th of next month. But we recommend an early visit, as interest in the exhibits seems on the wane; and many exhibitors would like to see the termination on a date earlier than that officially fixed.

The Conductivity of Glass.—Considerable attention has been given by Professor Ch. Gray to the determination of the circumstances which affect the conductivity and specific conductive capacity of glass. Various specimens were obtained from manufacturers in London and Jena, and they were all richer in lead and more free from soda than glasses formerly available. The Jena glass had low resistance from its high percentage of soda and complex composition.

Unproductive Municipal Undertakings.—Sir H. Fowler having, as mentioned in the "JOURNAL" last week, obtained his return relating to the reproductive undertakings of municipal corporations, Sir J. W. Maclure has given notice of his intention to move, early next session, for a return as to the water, gas, tramway, electric lighting, and "other unproductive undertakings," carried on by these bodies. He asks that the return shall set out the date at which the corporation commenced working, the amount of the capital provided by the corporation, and the amount borrowed, the amount paid off and now outstanding, the average annual income and working expenses for the last five years, the annual net loss, the amount set apart for depreciation, and the mode in which the annual net loss is provided for.

PERSONAL.

The position of Manager of the Uppingham Gas-Works has been obtained by Mr. W. B. PALMER, of the Stamford and St. Martin's Gas-Works.

Mr. T. DANN, who was for many years Assistant-Manager of the Bedford Gas-Works, under Mr. W. H. Smith (who has now resigned through ill-health), has been appointed Acting-Manager under Messrs. Paul W. Wyatt and Joseph Miller, who are named as joint Managing-Directors.

COMMUNICATED ARTICLE.

THE LOCAL GOVERNMENT BOARD AND THE PROTECTION OF WATER SUPPLIES FROM POLLUTION.

By PERCY GRIFFITH, Assoc.M.Inst.C.E., F.G.S., M.Inst.M.E.

(*Continued from p.* 306.)

I propose first to summarize the powers and responsibilities of local authorities and water companies with regard to the purity of the water supplied by them, as laid down in existing Acts of Parliament.

COMPANIES.

As is indicated in the Local Government Board clauses now under review, the clause which most definitely states the responsibility of water companies as regards the purity of the water supplied is section 35 of the Water-Works Clauses Act, 1847 (which see), which requires the undertakers to "keep in the pipes laid down by them a supply of pure and wholesome water." It must be observed, however, that the exception which is made in the ensuing section, "unless prevented by frost, unusual drought, or other unavoidable causes or accident," and which is adopted by the Local Government Board in relation to the *purity* of the water, does not in this Act have any reference whatever to this point, but refers merely to the compulsion to supply water to all the inhabitants of the company's district upon certain terms. It is not at all clear whether any direct relationship exists between frost or unusual drought and the purity of the water, although there is no doubt an *indirect* relationship, which may sometimes prove of great importance, and which, in fact, did so in the case of Maidstone.

Sec. 35.—The undertakers shall provide and keep in the pipes to be laid down by them a supply of pure and wholesome water, sufficient for the domestic use of all the inhabitants of the town or district within the limits of the Special Act, who, as hereinafter provided, shall be entitled to demand a supply and shall be willing to pay water-rate for the same, and such supply shall be constantly laid on at such a pressure as will make the water reach the top storey of the highest houses within the said limits, unless it be provided by the Special Act that the water to be supplied by the undertakers need not be constantly laid on under pressure, and the undertakers shall cause pipes to be laid down and water to be brought to every part of the town or district within the limits of the Special Act, whereunto they shall be required by so many owners or occupiers of houses in that part of the town or district, as that the aggregate amount of water-rate payable by them annually at the rates specified in the Special Act shall be not less than one-tenth part of the expense of providing and laying down such pipes, provided that no such requisition shall be binding on the undertakers unless such owners or occupiers shall severally execute an agreement binding themselves to take such supply of water for three successive years at least.

Sections 61 to 67 of the same Act (which see) provide water-works companies with very stringent powers in regard to the penalties incurred by persons causing or allowing the water to be fouled either before or after its collection and distribution, special mention being made of pollution caused by leakage of gas or by waste liquors, &c., from gas-works.

Sec. 61.—Every person who shall commit any of the offences next hereinafter enumerated shall for every such offence forfeit to the undertakers a sum not exceeding £5; that is to say—

Every person who shall bathe in any stream, reservoir, aqueduct, or other water-works belonging to the undertakers, or wash, throw, or cause to enter therein, any dog or other animal;

Every person who shall throw any rubbish, dirt, filth, or other noisome thing into any such stream, reservoir, aqueduct, or other water-works as aforesaid, or wash or cleanse therein any cloth, wool, leather, or skin of any animal, or any clothes or other thing;

Every person who shall cause the water of any sink, sewer, or drain, steam-engine boiler, or other filthy water belonging to him or under his control, to run or be brought into any stream, reservoir, aqueduct, or other water-works belonging to the undertakers, or shall do any other act whereby the water of the undertakers shall be fouled;

And every such person shall forfeit a further sum of twenty shillings for each day (if more than one) that such last-mentioned offence shall be continued.

Sec. 62.—Every person making or supplying gas within the limits of the Special Act who shall at any time cause or suffer to be brought or to flow into any stream, reservoir, aqueduct, or water-works belonging to the undertakers, or into any drain communicating therewith, any washing or other substance which shall be produced in making or supplying gas, or who shall wilfully do any act connected with the making or supplying of gas whereby the water in any such stream, reservoir, aqueduct, or water-works shall be fouled, shall forfeit to the undertakers for every such offence the sum of two hundred pounds; and such penalty shall be recovered with full costs of suit, in any of the Superior Courts; but such penalty shall not be recoverable unless it be sued for during the continuance of the offence, or within six months after it has ceased.

Sec. 63.—In addition to the said penalty of two hundred pounds, and whether such penalty have been recovered or not, the person making or supplying gas as aforesaid shall forfeit to the undertakers the sum of twenty pounds to be recovered in like manner for each day during which such washing or substance shall be brought or shall flow as aforesaid, or during which the act shall continue by which such water is fouled, after the expiration in either case of twenty-four hours from the time when notice of the offence has been served on such person by the undertakers.

Sec. 64.—Whenever the water supplied by the undertakers shall be fouled by the gas of any person making or supplying gas within the limits of the Special Act, such person shall forfeit to the undertakers for every such offence a sum not exceeding twenty pounds, and a further sum not exceeding ten pounds for each day during which the offence shall continue after the expiration of twenty-four hours from the service of notice of such offence.

Sec. 65.—For the purpose of ascertaining whether the water of the undertakers be fouled by the gas of any person making or supplying gas within the limits of the Special Act, the undertakers may dig up the ground and examine the pipes, conduits, and works of the persons making or supplying gas; provided that before proceeding so to dig and examine the undertakers shall give twenty-four hours' notice in writing to the person so making or supplying gas of the time at which such digging and examination is intended to take place, and they shall give the like notice to the persons having the control or management of the pavements or place where such digging shall take place, and they shall be subject to the like obligation of reinstating the road and pavement and to the same penalties for delay or any nonfeasance or misfeasance therein, as hereinbefore provided with respect to roads and pavements broken up by them for laying their pipes.

Sec. 66.—If upon such examination it appear that such water has been fouled by any gas belonging to such person, the expenses of the digging, examination, and repair of the street or place disturbed in any such examination shall be paid by the person making or supplying gas; but if upon such examination it appear that the water has not been fouled by the gas of such person, then the undertakers shall pay all the expenses of the examination and repair, and also make good to the said person any injury which may be occasioned to his works by such examination.

Sec. 67.—The amount of the expenses of every such examination and repair and any injury done to the undertakers shall in the case of any dispute about the same, together with the cost of ascertaining and recovering the same, be ascertained and recovered in the same manner as damages for the ascertaining and recovery whereof no special provision is made are directed to be ascertained and recovered.

These clauses do not, however, suggest any penalty being incurred by water companies, who, whether by oversight or neglect, allow their water to become fouled; and it is a difficult matter to say whether any penalty could under this Act be enforced against a company for this, and, if so, what the penalty is. Upon this point, therefore, it is very desirable to have some more definite provision, if only to give practical effect to the stipulation in the 35th clause that the water shall be "pure and wholesome."

Local Authorities.

It is evident from the tenour of the various Public Health and Local Government Acts dealing with this subject, that Parliament has always considered it to be specially within the province of local authorities to see that the water supplied in their district is pure and abundant; and I believe that if the duties of local authorities could be more clearly defined and made compulsory, instead of being left optional, very little further legislation would be required.

Clause 55 of the Public Health Act, 1875, requires local authorities owning water-works to keep thereon "a supply of pure and wholesome water" equally with water companies, although it is curious fact that the proviso with respect to the sufficiency of the supply found in the Water-Works Clauses Act, 1847, is neither repeated nor incorporated in this Act.

Sec. 55.—A local authority shall provide and keep in any water-works constructed or purchased by them a supply of pure and wholesome water; and where a local authority lay any pipes for the supply of any of the inhabitants of their district, the water may be constantly laid on at such pressure as will carry the same to the top storey of the highest dwelling-house within the district or part of the district supplied.

Section 68 of this Act prescribes the penalties incurred by gas undertakings which cause "any stream, reservoir, pond, or place for water" to be fouled, on the same lines as section 62 to 67 of the Water-Works Clauses Act, 1847, in regard to companies. Section 69 also empowers local authorities to take legal steps to prevent the fouling of streams by sewage. Section 70, which is usually taken to apply to the closing of private wells when reported to be "polluted so as to be injurious to health," is expressly worded so as to include "any well, tank, or cistern, *public* or private;" and it would appear to be in itself ample authority for the closing of any water-works or part of a water-works which might be shown to contain polluted water. It is evident that some such procedure as this would be a far more effectual protection from disease than the inflicting of a penalty only, as it would involve quite sufficient expense upon the water-works authorities to act as a deterrent against neglect, and would at the same time prevent the supply of polluted water to consumers—which, after all, is the vital point to be aimed at.

Sec. 68.—Any person engaged in the manufacture of gas who (1) causes or suffers to be brought or to flow into any stream, reservoir, aqueduct, pond, or place for water, or into any drain or pipe communicating therewith, any washing or other substance produced in the making or supplying of gas; or (2) wilfully does any act connected with the making or supplying of gas whereby the water in any such stream, reservoir, aqueduct, pond, or place for water is fouled, shall forfeit for every such offence the sum of two hundred pounds and, after the expiration of twenty-four hours' notice from the local authority or the person to whom the water belongs in that behalf, a further sum of twenty pounds for every day during which the offence is continued or during the continuance of the act whereby the water is fouled.

Every such penalty may be recovered with full costs of suit in any of the Superior Courts, in the case of water belonging to, or under the control of, the local authority by the local authority; and in any other case by the person into whose water such washing or other substance is conveyed or flows or whose water is fouled by any such act as aforesaid, or in default of proceedings by such person after notice to him from the local authority of their intention to proceed for such penalty by the local authority. But such penalty shall not be recoverable unless it be sued for during the continuance of the offence, or within six months after it has ceased.

Sec. 70.—On the representation of any person to any local authority that within their district the water in any well, tank, or cistern, public or private, or supplied from any public pump, and used or likely to be used by man for drinking or domestic purposes or for manufacturing drinks for the use of man, is so polluted as to be injurious to health, such authority may apply to a Court of Summary Jurisdiction for an order to remedy the same, and thereupon such Court shall summon the owner or occupier of the premises to which the well, tank, or cistern belongs, if it be private, and in the case of a public well, tank, cistern, or pump, any person alleged in the application to be interested in the same, and may either dismiss the application or may make an order directing the well, tank, cistern, or pump to be permanently or temporarily closed, or the water to be used for certain purposes only, or such other order as may appear to them to be requisite to prevent injury to the health of persons drinking the water.

The Court may, if they see fit, cause the water complained of to be analyzed at the cost of the local authority applying to them under this section.

If the person on whom an order under this section is made fails to comply with the same, the Court may, on the application of the local authority, authorize them to do whatever may be necessary in the execution of the order; and any expenses incurred by them may be recovered in a summary manner from the person on whom the order is made.

Expenses incurred by any rural authority in the execution of this section and not recovered by them as aforesaid, shall be special expenses.

There is, however, one point in connection with this which is left somewhat vague in existing Acts of Parliament; and that is the power of entry upon the works when these are owned by a company. Clauses 102 and 103 of the Public Health Act, 1875, under the heading of "Nuisances," provide a model for such a definition, though they do not themselves cover the case in question.

Sec. 102.—The local authority, or any of their officers, shall be admitted into any premises for the purpose of examining as to the existence of any nuisance thereon, or of enforcing the provisions of any Act in force within the district requiring fireplaces and furnaces to consume their own smoke, at any time between the hours of nine in the forenoon and six in the afternoon, or in the case of a nuisance arising in respect of any business, then at any hour when such business is in progress or is usually carried on.

Where under this Act a nuisance has been ascertained to exist, or an order of abatement or prohibition has been made, the local authority, or any of their officers, shall be admitted from time to time into the premises between the hours aforesaid, until the nuisance is abated, or the works ordered to be done are completed, as the case may be.

Where an order of abatement or prohibition has not been complied with, or has been infringed, the local authority, or any of their officers, shall be admitted from time to time at all reasonable hours, or at all hours during which business is in progress or is usually carried on, into the premises where the nuisance exists, in order to abate the same.

If admission to premises for any of the purposes of this section is refused, any Justice, on complaint thereof on oath by any officer of the local authority (made after reasonable notice in writing of the intention to make the same has been given to the person having custody of the premises), may, by order under his hand, require the person having custody of the premises to admit the local authority, or their officer, into the premises during the hours aforesaid, and if no person having custody of the premises can be found, the Justice shall, on oath made before him of that fact, by order under his hand authorize the local authority, or any of their officers, to enter such premises during the hours aforesaid. Any order made by a Justice for admission of the local authority, or any of their officers, on premises shall continue in force until the nuisance has been abated, or the work for which the entry was necessary has been done.

Sec. 103—Any person who refuses to obey an order of a Justice for admission of the local authority, or any of their officers, on the premises shall be liable to a penalty not exceeding five pounds.

Clauses 305 and 306 of the Act might almost be held to be sufficient for the purpose as they stand; and at any rate a very slight modification would render them more suitable to the case in question than clause 102, inasmuch as an order of the Court would be required before forcible entry could be made—a very necessary protection to companies, if local authorities are to be given such large powers as have been proposed by the Local Government Board.

Sec. 306.—Any person who wilfully obstructs any member of the local authority or any person duly employed in the execution of this Act, or who destroys, pulls down, injures, or defaces any board on which any bye-law notice or other matter is inscribed, shall, if the same was put up by authority of the Local Government Board or of the local authority, be liable for every such offence to a penalty not exceeding five pounds.

Where the occupier of any premises prevents the owner thereof from obeying or carrying into effect any provisions of this Act, any Justice to whom application is made in this behalf shall, by order in writing, require such occupier to permit the execution of any works required to be

executed, provided that the same appear to such Justice to be necessary for the purpose of obeying or carrying into effect the provisions of this Act; and if within twenty-four hours after the making of the order such occupier fails to comply therewith, he shall be liable to a penalty not exceeding five pounds for every day during the continuance of such non-compliance.

If the occupier of any premises when requested by, or on behalf of, the local authority to state the name of the owner of the premises occupied by him, refuses or wilfully omits to disclose or wilfully mis-states the same, he shall (unless he shows cause to the satisfaction of the Court for his refusal) be liable to a penalty not exceeding five pounds.

The Public Health (Water) Act, 1878, goes much nearer to the point than the Act of 1875, as the following section (7) will show:—

It shall be the duty of every rural sanitary authority from time to time to take such steps as may be necessary to ascertain the condition of the water supply within their district; and the authority may pay all reasonable costs and expenses incurred by them for the purpose of taking such steps. The authority, or any of their officers, or any person duly authorized in writing for that purpose by the authority, if they or he have or has reasonable ground for believing that any occupied dwelling-house in the district is without a proper supply of wholesome water, sufficient for the consumption and use for domestic purposes for the inmates of such house, shall be admitted into the premises for which such supply is required, *or from which the water supply may be derived*, for the purpose of ascertaining whether or not such house has such a supply within a reasonable distance; and for the purposes of any such admission, sections 102 and 103 of the Public Health Act, 1875, shall apply in the same manner as if such admission were necessary for the purpose of examining as to the existence of any nuisance on the premises, and the person so authorized as aforesaid were an officer of the rural sanitary authority.

It should be observed that this is a compulsory, and not an optional, clause; and the expression "or from which the water supply may be derived," might reasonably be held to include any existing water-works. A very slight amendment, such as "from which the supply *may be or is* derived," would meet the case, and would, in my opinion, cover all that is involved in the clauses as they were recently proposed by the Local Government Board.

Referring again to the general responsibility of local authorities with regard to the purity of the supply, the Public Health (Water) Act, 1878, is very distinct upon this point, making the duty a compulsory one, and not optional.

Section 3 reads: "It shall be the duty of every rural sanitary authority, regard being had to the provisions in this Act contained, to see that every occupied dwelling-house within their district has within a reasonable distance an available supply of wholesome water sufficient for the consumption and use for domestic purposes of the inmates of the house;" and though this refers more directly to individual houses, still it clearly states the duty of the local authority to see that *every house has a supply of wholesome water.*

(*To be continued.*)

Coal Testing by the Rontgen Rays.—According to M. Couriot, carbon in all its forms is very transparent to the Röntgen rays, while silica and silicates are opaque. By placing a lump of coal between a Crookes tube and a fluorescent screen, all the slag and clinker forming parts of the fuel can be detected. In this manner M. Couriot has tested anthracite and bituminous coal, lignite, coke, and block fuel. The conglomerate character of the latter is clearly shown; and in coke the particles of iron sulphide show as black spots on the screen. Rough lumps of coal, 1½ to 2 inches thick, may be used, with an exposure of five minutes, and with a coil having a 10-inch spark.

The Specific Heats of Gases.—Professors Lummer and Pringsheim have communicated to "Wiedemann's Annalen" the results of their determinations of the ratio of the specific heats of certain gases. These results were obtained from the relationship between temperature and pressure in an adiabatic expansion of the gas, a new form of bolometer being employed in the measurement of temperature. The final values obtained for the ratio in question are: Air, 1·4025; oxygen, 1·3977; carbonic acid, 1·2995; and hydrogen, 1·4084. These values are rather greater than those obtained by the same writers as far back as the year 1887, when a silver wire 0·04 mm. thick was used in the bolometer.

The Flow of Water in Pipes.—The problem of the flow of water in uniform pipes and channels, said by Saint Venant to constitute a hopeless enigma, forms the subject of a comprehensive paper by Mr. G. H. Knibbs in the "Journal and Proceedings of the Royal Society of New South Wales," a brief notice of which appears in "Nature." The formulæ used by engineers in general are shown by the author to be systematically defective, even in respect of their mathematical form; and the main object of the paper is to indicate a scheme of empirical analysis of, and to develop a type of formula for, the flow of water in pipes and channels. By means of tables, the general expression supplied can be rendered easy of manipulation for the purposes of practical calculation. Mr. Knibbs concludes that the law of velocity as related to temperature with at least two (or better three) pipes of very different roughness, requires further experimental investigation. The variation of the velocity with respect to the radius of pipes also needs investigation.

NOTES.

The Preservation of Timber by Tar and Tar Oils.

A method of treating coal tar for rendering it more serviceable for the protection of timber from decay is mentioned in a recent circular of the United States Division of Forestry. After describing the best means of seasoning woods in the log and cut, the circular proceeds to utter a warning against applying paint or other coating to green or unseasoned timber. If the wood is not well dried or seasoned, the coating will only hasten decay. For coating timber which has been properly treated by seasoning and drying, coal tar with or without sand or plaster added, and pitch—especially if mixed with oil of turpentine and applied hot—is the best preservative. A mixture of three parts of coal tar and one part of clean, unsalted grease (the latter to prevent drying until the tar has had time to fill the minute pores of the timber) is recommended. Both tar and oil paint share the drawback of being mere coverings. If the wood has any chance of getting moist before they are laid on, these coatings do more harm than good. Heavy tar oils, freed by distillation both from their volatile and tarry companion products, are preferable to both paint and tar. These oils penetrate timber and act as disinfectants. They are preferably applied hot, either with a brush or as a bath. The appearance of the treated wood is against it. Charring the ends of posts intended to be buried in the ground is not recommended in preference to tarring, as it merely insulates the wood from the ground, but develops large cracks through which the interior is in time attacked.

Ventilation Tests.

At a meeting of the American Society of Heating and Ventilating Engineers, Mr. J. C. Northcott read a paper on some accepted tests of ventilation, the reliability of which he questioned. The author admitted that the practice of testing the efficiency of the ventilation of interiors is of recent growth, which accounts for the crudity of the methods employed. To test the degree of impurity of air in occupied rooms, it is usual to determine the proportion of carbonic acid present; but Mr. Northcott argues that for two reasons this test is only approximate. Carbonic acid is not the only or the worst poison discharged into the air of an occupied room. Animal exudations are far more objectionable; but they can only be detected in a general way by the sense of smell. Mr. Northcott objects to the test for carbonic acid being regarded as an indication of the degree of what he calls "crowd poisoning," except when due regard is paid to the limitations of the test. The use of the anemometer is commended as offering the best of all known tests of ventilation, which is, after all, nothing more than dilution. Yet, unless used intelligently and with care, even this method may yield misleading results. The author's general conclusion is that ventilation tests which are recognized as being defective must continue in use, because there are no better. They must be employed, however, with full knowledge of their shortcomings, and with a disposition to carefully watch for every affecting circumstance. It was testified in the discussion on the paper that the anemometer is generally preferred to the chemical test for ventilation.

Sampling and Testing Oils.

A useful article on sampling and testing lubricating oils and fats in the workshop appeared in the "Engineer" for the 22nd ult. It described certain ready, yet accurate, means of sampling lubricating oils and fats with a view to ascertaining their commercial purity and suitability for the uses to which they are put in workshop practice. These processes comprise the determination of specific gravity; the action of alkalies; the action of sulphuric acid; testing for the presence of free acid; testing viscosity; testing rate of evaporation. For testing the specinc gravity, the use of a 1000-grain bottle is recommended. The common form of hydrometer, called oleometer when adapted to determine the specific gravity of oils, is objecte dto as being seldom accurate. It is remarked that the specific gravity of different oils, if pure, is never the same; but, on the other hand, that of different lubricating oils is so nearly equal as to necessitate great care in making the determination. The alkali test is intended to distinguish a fatty oil from a mineral oil by causing saponification of the former, whether it is sampled alone or in a mixture. With mineral oils, which do not contain oxygen, the alkali forms an emulsion. The test with sulphuric acid is intended to differentiate oils in two ways—one by means of the colour imparted to the mixture of oil and acid, and the other by the temperature of the mixture. The several other tests of oil are described with great clearness, but so as to convey the impression that the complete series of operations is not to be performed without considerable pains, and the observance of multitudinous minute precautions to secure reliability.

The Comparative Economy of Different Sources of Power.

Mr. Charles Weiss has abstracted for "Engineering" a learned article by Herr Chr. Eberle, of Duisburg, on the comparative economy of different sources of power. The author remarks that the only practical sources of energy available for industrial uses are water, steam, and gas. The cost of water power is made up chiefly of the charges for interest and redemption of the capital outlay, and is so dependent on local considerations

as not to come into a general inquiry. Steam and gas are the real rivals; and their comparative merits have to be determined with reference to the size of the installation, the kind of work required of it, and the cost of fuel. The author investigates the cost of the production of steam power for different sized units, taking interest on capital at the uniform rate of 4½ per cent., and depreciation on machinery at 7 per cent., and on buildings at 2½ per cent. It is impossible to give the author's conclusions in a summarized form. They will be found as condensed as is consistent with intelligibility in the issue of our contemporary for the 8th ult. With regard to gas-power plant, it is admitted that gas-engines have hitherto not been constructed for very high powers. The largest unit mentioned by the author is a two-cylinder engine of 200-horse power, made by the Gasmotoren Fabrik-Deutz for a cement-works in Switzerland. Using coke in the gas producer, the German rule is to take the consumption of fuel at 1·654 lbs. per brake horse-power. The general result of the comparison is to show that, in places where fuel is expensive, gas power offers material advantages as against steam power. It is anticipated that there will shortly be a very large increase of gas-power installations for industrial undertakings.

A New Welding Process.

A remarkable new process for the production of high temperatures, capable of use in metal working, has been suggested by Herr Goldschmidt. It depends upon the extremely violent action which takes place when aluminium unites with oxygen. So high is the temperature thus produced, estimated at 3000° C., that the chief difficulty is so to moderate and control the reaction that it will do useful work. The process is capable of two main applications. In the first place, the heat given off by the combustion of a mixture of aluminium with any convenient oxide may be utilized for heating purposes only, as in welding; or the reducing power of aluminium at a high temperature may be applied to the preparation of pure metals or alloys. If a moderate heat is required, the reacting mass is diluted by the addition of some inert substance, which, at the same time, prevents the whole mass from melting. The following experiment illustrates the character of the process: A large iron rivet is surrounded by a mixture of oxide of iron, sand, and powdered aluminium, and almost wholly embedded in sand contained in a wooden box. On the top of the exposed portion of the aluminium mixture is laid a small ball prepared by mixing aluminium powder with a more easily reducible oxide, into which is inserted a short length of magnesium ribbon. The reaction is started by setting fire to the ribbon; and as soon as this is done, more sand is placed on the top in order to keep in the heat. After a short time, the rivet may be taken out white hot. Similarly wrought-iron pipes, &c., may be welded, or fused together, very cheaply; the process being regarded as more efficient than electric welding, owing to the greater uniformity of the heat produced.

The Lecomte Low-Pressure Incandescent Burner.

Some short time since it was mentioned in the "JOURNAL" that the Société Technique du Gaz en France had awarded a prize of 500 frs. to M. Lecomte for his low-pressure incandescent gas-burner, which in the opinion of the Committee of the Society possesses a marked superiority over existing burners of this class. This opinion was formed after a series of tests carried out by the Committee, whose report thereon is given in the last number of the "Journal des Usines à Gaz." Six burners were submitted, divisible into two groups—burners working at a pressure of 4-10ths to 1 inch; and those requiring greater pressure than this. M. Lecomte considers that burners constructed to work at the pressure (usually tolerably high) required by the ordinary incandescent system should give more light for the same consumption of gas, or consume less gas for the same yield of light. The Committee's experiments do not lead to the conclusion that this ideal has been realized. They show that M. Lecomte's burners of the second group are neither inferior nor superior to other well-made incandescent gas-burners—for example, those of the Welsbach Company. His economic low-pressure burner, however, possesses this advantage over the Auer burner, that it furnishes the same results at considerably lower pressures. The sample submitted to the Committee gave the light of 8 to 9 carcels (about 76 to 86 candles) with a consumption of 12 to 14 litres (0·42 to 0·50 cubic foot) per carcel-hour, at a pressure of 6-10ths. It was then regulated for a No. 4 Welsbach mantle, with the following results:—

Pressure.	Illuminating Power. Carcels.		Candles.	Consumption of Gas. Litres per Carcel-Hour.		Cubic Foot.
7-10ths ..	10·80	=	163·6 ..	.. 12·0	=	0·423
10-10ths ..	12·50	=	120·0 ..	.. 12·4	=	0·437

The following results were obtained with a Welsbach burner, using the same mantle:—

Pressure.	Illuminating Power. Carcels.		Candles.	Consumption of Gas. Litres per Carcel-Hour.		Cubic Foot.
12-10ths ..	10·30	=	99·0 ..	.. 12·7	=	0·448
16-10ths ..	12·27	=	117·8 ..	.. 12·4	=	0·437

These results show that the Lecomte burner possesses the merit of yielding, at the lowest pressures now generally used in the distribution of gas, the same results as the best incandescent burners upon the market; and, moreover, the results are not appreciably affected by ordinary variations of pressure.

TECHNICAL RECORD.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

Annual Meeting at Portadown.

The Annual Meeting of the North of Ireland Association of Gas Managers was held in the Young Men's Institute, Portadown, Co. Armagh, last Tuesday, under the presidency of Mr. J. NISBET, Manager of the Portadown Gas-Works, the President for the year. The members, of whom there was a larger attendance than ever, assembled in the forenoon, and most of them paid a visit to the gas-works, which were found in a very trim condition—in fact, it was in some places difficult to say where the works ended and the garden began, the two were so much mixed up together. In the retort-house, there are at present two benches, face to face, in which there are on one side three settings of fives, and on the other two settings of fours and two of threes, all fired on the direct system. At the end of the former bench, Mr. Hamilton, of Hamilton (Scotland), is about to erect three settings of sixes on the generator principle; but they are not expected to be ready for the coming winter. At the foot of the garden, embowered among fruit trees, are two gasholders—one being on the Gadd and Mason principle of guiding, which was an object of interest to the members.

The business commenced shortly after eleven o'clock.

The PRESIDENT said Mr. Thornton, the Chairman of the Gas Company, intended to have been there at that time to welcome the members to the town, and to invite them to luncheon in the afternoon; but, unfortunately, it turned out that, this being a general holiday in Portadown, his assistants were away, some business had come in, and he could not make it convenient to attend the meeting, but he would be present at the luncheon.

REPORT AND ACCOUNTS.

The HON. SECRETARY (Mr. James Whimster, of Armagh) read the report of the Committee. It commenced by expressing regret at the loss sustained by the Association through the removal by death of two of the oldest members—Mr. M. Martin, of Drogheda, and Mr. D. M'Callum, of Omagh—who, though both advanced in years, were regular attendants at the annual gatherings. The subjects of standardizing meter-unions and the Workmen's Compensation Act, 1897, had been brought under the notice of the Committee by the North British and North of England Associations respectively, and would be discussed at the meeting. The Committee regretted that the offer of medals for competition papers had borne so little fruit—only one paper having been sent in last year, and none this. It was suggested that the meeting should decide as to the advisability of continuing the offer. The accounts accompanying the report showed a balance in hand of £20 17s. 7d. The membership stands as follows: Ordinary members, 54; extraordinary members, 20; honorary members, 2—total, 76.

Mr. T. FRIZELLE (Holywood) moved, and Mr. A. GIBB (Newry) seconded, the adoption of the report and accounts.

Mr. D. WILLIAMSON (Clones) suggested that the Secretary might be instructed to formally express the sympathy of the members with the relatives of the two deceased members.

The SECRETARY explained that he attended the funerals of both members as the representative of the Association.

Several members having testified their appreciation of the valuable services rendered by the two deceased members, it was resolved that the minutes of the day's meeting should contain a formal expression of the deep sense of loss which the members felt by the death of their colleagues.

The report and accounts were adopted.

The HON. SECRETARY said he received a telegram from Professor Macadam on the previous day, expressing his regret that he could not be with them; and he had since had a letter confirming the telegram. [Mr. Whimster read the letter, in which Professor Macadam explained that he had just returned from Aldershot, and was under orders to report on the Camp in person on the day of the meeting.] They were all very sorry Professor Macadam could not be with them; but it was a matter which could not be avoided.

NEW MEMBERS.

The following were admitted to the Association:—

Ordinary Members.—Mr. R. Campbell, of Carrickfergus; Mr. John G. Toombs, of Carrick-on-Suir; Mr. R. Bruce Anderson, of Westminster and Kilkenny; Mr. W. Barnett, of Roscommon; Mr. P. Maguire, of Cavan; Mr. M. Morgan, of Navan; and Mr. G. W. Young, of Carlow.

Extraordinary Members.—Mr. H. Allender, of London; Mr. Thomas J. Cotton, Inspector of Lighting, Dublin; Mr. J. Clark, of Meters Limited, Glasgow; Mr. J. T. Harvey, of Belfast; Mr. A. W. Lyon, of London; Mr. J. Slight, of Glasgow; and Mr. S. W. Tamplin, of Manchester.

Election of Office-Bearers.

Office-bearers were next elected, as follows:—

President.—Mr. J. Auchterlonie, of Mullingar.

Vice-President.—Mr. G. R. Love, of Dundalk.

Hon. Secretary and Treasurer.—Mr. J. Whimster, of Armagh.

Committee.—Mr. A. Gibb, of Newry; Mr. C. B. Tully, of Sligo; and Mr. S. B. Langlands, of Coleraine.

Proposed Presentation to Mr. Whimster.

Mr. T. Llewellyn (Newbridge) said he would crave permission to remark that Mr. Whimster had now served them for eleven or twelve years, and it was, he thought, time the members rendered him some token of their appreciation of his services to the Association. He moved that steps should be taken to this end.

Mr. T. Frizelle (Holywood) expressed his great pleasure in seconding the motion. He said Mr. Whimster was the originator of the Association, and had been the life and soul of it. He had kept the members together, and during the twelve years had done a great amount of work for them; and he (Mr. Frizelle) thought the least the Association could do would be to recognize his services in some tangible form.

Mr. Whimster said he had to thank the members very much for so cordially appreciating his services, and for again appointing him Secretary. He would have been glad, after twelve years' service, and seeing that the Association was, as he might say, pretty successfully floated, if they had relieved him of the office, and appointed a younger man to take up the burden. It was not, however, that he had any wish to throw it off. He liked the work and the Association; and he was glad to see it prospering. With reference to their gold medal competition, he wished to say that the offer of a gold medal had put him in a fix, because it was left till the 1st of July to send in competition papers, and until then he could not tell whether there were to be any or not. Therefore the time was too short between then and the second Tuesday in August for him to provide anything else, if no papers came forward. With reference to the proposal to recognize his services, he would much rather that they would not say anything about it.

Mr. P. Hurll (Glasgow) thought it would be only fair that they should do something to show their appreciation of Mr. Whimster's services; and he suggested that a small Committee should be appointed to put the matter into form. He was quite sure that any appeal from such a Committee would meet with a hearty response.

The proposal was adopted, and a Committee appointed, consisting of the President-elect (Mr. Auchterlonie), Mr. Llewellyn, Mr. Gibb, and Mr. A. Mackenzie, of Edinburgh.

The President's Address.

The President then delivered the following

INAUGURAL ADDRESS.

In addressing you for the second time as your President, I do so with mingled feelings of pleasure and regret; pleasure at meeting once more with so many brother managers and friends, and regret at the loss of two of our oldest members—I refer to the late Mr. D. M'Callum, of Omagh, and Mr. M. Martin, of Drogheda. Both of them were with us at our meeting in Omagh last year, and both have been taken away from among us by death. Those of us who knew those members best know the deep interest they both took in the affairs of the Association from its very first formation.

I am glad to be able to say that, both numerically and financially, our Association is in a very healthy and flourishing condition. Our membership is steadily increasing; and I have reason to believe that our meetings and discussions from time to time have drawn us together in a closer bond of brotherhood, and have been beneficial to us one and all.

One circumstance which shows that managers are beginning to understand the advantages of joining our Association is that there are now a considerable number of our members from the South and West—from as far South as Bandon and Skibbereen, and as far West as Galway and Tralee. Still there are a good number outside yet, who would I believe find it to their advantage to join us. Let no one think he has already learned as much of his business as he will require; for in this progressive age something new is turning up almost every day, and anyone who has a desire and ambition to better his position in life must study hard, and work hard, to keep himself acquainted with all improvements as they come out. If he does not, he will not succeed; for I can assure you there is a great deal more required from a gas manager now than there was a few years ago. If we take a glance back, say fifteen or twenty years (in small works, more especially), we see that, if the manager made the gas and distributed it in sufficiently large sized pipes to the various parts of the town, he had done nearly all that was expected from him. But now, if he is going to compete successfully with the electric light and with cheap oil, he must know and do a great deal more. He must know how to work generator and regenerative furnaces, so that he may get the best results both as to the quantity and the quality of his gas. He must know how to make the very best of his residuals. He should know how to make sulphate of ammonia. And within the past few years another new branch has come upon us—that is the supplying and fitting-up of gas cooking-stoves, fires, laundry irons, &c. The manager must also know and be able to explain to consumers about the great variety of burners that are now competing one against another. To be able to do these and a great number of other things which I have not mentioned, but which must be dealt with as they arise, I know of no better method than to join our Association, and take as active a part as possible in its business. I would, therefore, for your own benefit ask you all to take a still greater interest in the affairs of our Association.

The gas industry, in the face of all opposition, still holds its place in the forefront of all competitors for the supply of artificial light. And every week as we receive our technical journals we read of some new departure in the apparatus for manufacturing, distributing, or consuming gas. And as I presume you all get these journals, it makes it difficult for me to bring anything before you that you have not already read or heard about; for although ours is the only Gas Managers' Association in Ireland, there are no less than seven kindred Associations in England, and three in Scotland, where papers are read and discussed on every subject connected with the manufacture and distribution of gas. In a great majority of cases these papers are contributed by managers of large works, who have long experience, better apparatus for experimenting with, and last, but not least, more time at their disposal than most of us have, who personally must superintend every detail from the retort-house to the burner.

Coal has been comparatively cheap for the past two or three years; and as the selling price of every manufactured article mainly depends upon the cost of the raw material, and, as we all know, the cheaper an article can be sold the greater the consumption, therefore gas companies, like other manufacturers being always anxious to extend their business, have from time to time reduced the price of gas, until now I think I may safely say gas is sold all over the three kingdoms cheaper than it has ever been before.

But, unfortunately, this season there is another miners' strike—this time in Wales; and the coalowners have higher wages to pay. Besides, like all other employers of labour, gas companies included, since the coming into force last month of the Workmen's Compensation Act, they have to take into account, and provide for, the extra liabilities they are now under. To meet this extra expense, coal has gone up in price from 6d. to 1s. per ton.

There is also this year a considerable advance in the price of retorts, bricks, and all fire-clay goods. Those increased prices will tell heavily, especially against small works, where the price of gas is now as low as can be, consistent with the proper maintenance of the works, and the payment of the ordinary dividends to the shareholders.

It is a pleasure to us when we can announce a reduction in price. When we do so, our consumers are pleased, although not perfectly satisfied; for if the reduction is 5d. per 1000 cubic feet they will tell you it should have been 10d. But when coal, fire-clay goods, wages, &c., rise in price, and the price of gas must be raised to enable us to get ends to meet, then something like a rebellion arises, and our consumers economize in every way they can. Some will take to electric light, if they can get it, although it would cost them a great deal more money, and some will take to oil, with all its trouble and bad smell, rather than pay the increased price for gas.

Well, that is a state of things we must do our very utmost to avoid. There are a number of ways which we can take to do so. And first, I will say let us do our utmost to make gas as popular as we can, not only for lighting purposes, but let us push the sale and hire of cooking-stoves, fires, laundry irons, &c. I have a good number in Portadown; and I find that where a gas cooking-stove has been introduced into a house, it is very seldom returned. To push this business a good deal of time and tact are required. One must be able to show the people how to use them, and how to use them economically. It takes time and patience—more, indeed, than sometimes we can well spare; but in the end it pays. When fitting up a cooking-stove, be careful to let the good lady of the house know that it is a stove for cooking with. I well recollect the very first cooking-stove I fitted up in Portadown. There was a meter for it independent of the house lights; the object being to ascertain exactly what the cost of cooking would be. The first account was very large. I was sent for, and heard the usual tale of how little had been cooked with it, and that the stove must be wrong, or the meter, or both. They had read in the papers about a dinner being cooked for 2d., and theirs was a long way beyond that; they must quit the stove, &c., &c. But after a bit of manœuvring and questioning, I discovered that not only had all the cooking been done upon the stove, but water had been boiled on it for the family washing and washing of floors also. I had to explain that the stove would do all that, but that was not cooking. Needless to say, the next account was not so heavy.

Another thing we can do is to introduce prepayment meters. There is a very wide field for them, because they are suited, I may say, to an almost entirely new class of consumers, and can be fitted with advantage to very small houses or shops. I have a considerable number in Portadown, and am adding to them. Most of my prepayment consumers were burners of oil, and now they tell me that they would not like to go back to oil again. We are to have a paper from Mr. Ross, of Dungannon, on prepayment meters; and I am certain we shall benefit by his

experience, which he will freely give us. So, therefore, I will say no more about them, only this—fit up as many of them as you possibly can in houses and shops where oil is at present used.

And as we try to extend our business by supplying cooking-stoves, prepayment meters, &c., we must not overlook the apparatus inside the works gate. Get the best apparatus you can, and when you have got it do not neglect it, but keep it always in thorough repair and working order. I hold that if a works will not pay to be kept in thorough working order, you need not expect it to do so if you neglect it.

And do not overlook the distributing plant; for it will not pay to make gas, and let it escape through badly laid main and service pipes. One great enemy—I might say the greatest we have to mains and services—is the traction engine. No doubt it is a great convenience in a large number of ways; but when we see it passing along our streets dragging a huge steam-boiler, or a string of heavily-loaded trucks, how we tremble for the safety of our pipes which it is passing over. Not only have we the trouble and expense of repairing them when broken, but there is the risk of escaping gas getting into drains, and doing great damage, even to the loss of life, as was the case in Drogheda about two years ago. To prevent this as far as possible, mains and services should be laid as deep as can be, so that there is a fall to the water traps. It cannot always be done; but where possible mains should not be less than 2 feet from the surface.

We all know that, however careful and painstaking we may be to give our consumers the very best and purest gas we can make, our efforts are often frustrated by the way consumers use it, or rather, I should say, misuse it, after it has passed the meter, and is beyond our control. If meter-rents are charged, they will, to save the extra rent, insist upon a 2-light meter, when it would require a 3-light to pass the quantity of gas sufficient to properly light the house or shop. And in the same way they insist on a 3-light meter when it should be a 5-light, and a 5-light when it should be a 10-light, and so on in proportion. Of course, the meter cannot do it; and they blame the gas. Another cause is small pipes badly laid. Houses and shops are nearly always gas-fitted by contract—the lowest estimate taken. Pipes are laid in the quickest and easiest way. All may do well for a short time, but soon water gathers, and the lights begin to jump; or a few more lights may be put upon the already too small pipes and overtaxed meter. No consumer ever thinks of blaming himself for having taken the lowest estimate, nor the gas-fitter for not doing his work properly. But again the cry is "Bad gas." It has often been said that gas companies should take gas-fitting into their own hands. If they did so, I believe it would be for the benefit of the consumer as well as the gas company. But I for one would not like to incur the risk; for now under the Workmen's Compensation Act I am afraid they would be accountable for a very great deal more than they will be if every consumer fits his premises by his own gas-fitter. This is a new Act; and as yet we have no experience of its working. Mr. Gibb, of Newry, has been studying it, and will open a discussion upon it, when we shall better understand its provisions. If gas consumers could be got to pay more attention to their pipes and fittings, and to use the best lamps and burners, we would soon cease to hear the oft-repeated cry of "Bad gas," and the consumer would have a better light for his money.

We very often hear the phrase used—"Educate the people, educate the people." I perfectly agree with that. Yes, educate the people. More especially would I rejoice if we could educate gas consumers, whether they be town commissioners or private individuals, to understand that gas companies are always willing to supply them with any quantity of gas they require, provided always they pay for it. And if their houses and shops are not properly lit, the fault is their own, and not the gas company's. The same applies to the lighting of our public streets. Let the ratepayers understand that the efficient or the inefficient lighting of the streets does not lie with the gas company, but with themselves, through their representatives, the town commissioners.

I observe that inclined retorts are being adopted in quite a number of large works in England, and are giving great satisfaction. They, however, are not suitable for small works such as ours. I believe the generator or regenerative system is better suited for our works. I have lately seen some settings on the generator system with a sunk chamber of only 3 ft. 3 in.; the retorts being kept at a splendid heat with four-hour charges on a fuel consumption of 30 per cent. of the coke made.

At present I am building a new bench of three ovens, with six retorts in each, on the generator system. The sunk chambers are 5 feet deep. I would have been pleased if the work had been far enough advanced for you to have seen the plan of the flues, combustion chamber, &c.; but it is not so. I hope that at some future meeting I may be able to tell you of the results obtained by this setting.

One thing you will see at our works, which will be new to some of you, is a columnless spiral-guided gasholder on Gadd and Mason's principle. It is 60 feet in diameter, by 20 feet deep, with a hydraulic cup for telescoping when required. It was erected in 1893. It rises and falls very steadily, even in the heaviest gales of wind. I have had no trouble with it, except once during the extra severe frost of the winter of 1894. The ice had frozen very hard on the water in the tank, and round about the inlet and outlet pipes. When the holder went down with the spiral motion it pulled the pipes with it; the joints at the ducks-foot bends gave way, and the pipes filled with water. I had to empty the tank, and get all set up again; but it has worked well ever since. Another thing which will be new to most of you is a Weck's centre-valve for a set of four 12-feet square purifiers, with 12-inch connections, which I erected two years ago.

At present I am cutting out an old gasholder, and converting the tank into a tar and ammoniacal liquor tank, or rather into two tanks—one for tar and one for liquor. If any of you are contemplating doing anything in that way, you can see the plan I am doing mine on, and it may be useful to you.

There has been a good deal of discussion lately about the standardizing of meter-unions; and I hope that there will be some practical result from it. Mr. Auchterlonie, of Mullingar, is to open a discussion on this subject; and I hope the result will be that the various meter makers will agree to make unions all to one pattern and pitch of thread.

Another thing I may mention, and I think it would be as useful as the unions—that is the standardizing of retorts. If this could be done retort makers could always have a stock on hand, the same as they have of bricks. Then we would be saved the waiting, sometimes of months, before our orders can be supplied.

And now, as you will be anxious to hear the papers read, I will not detain you any longer. I trust the meeting to-day will be for our mutual benefit.

Mr. E. Stears (Lisburn) proposed a hearty vote of thanks to the President for his address. He said it was very difficult to get anything new to say in an address to an Association like theirs; but he was sure Mr. Nisbet had acquitted himself to the satisfaction of everyone.

Mr. G. R. Love (Dundalk) said they had all listened with pleasure to the very interesting address they had had from the President. It was, perhaps, not full of elaborate phrases, nor yet of finely turned points; but Mr. Nisbet had given them his own practical experience, which was backed up by a great deal of reserve power. He (Mr. Love) might just say, in passing, that in one point at least he thought the President had been napping, for neither generator nor regenerative retorts had anything to do with inclined retorts. He had, however, much pleasure in seconding the vote of thanks to the President.

The President expressed his thanks for the kind remarks made.

Presentation of the Gold Medal.

The President said that the next item of business was the very interesting and pleasant one of presenting the first gold medal which had been won by any member of the Association. There was only one matter for regret in connection with the subject, and that was that there were no papers presented for competition this year. He hoped the presentation of this medal to Mr. Patrick Egan, of Tralee, for his paper on "A Difference in Hydraulic Mains," would be an incentive to other members, and that next year the Secretary would be inundated with papers. Addressing Mr. Egan, he said it gave him very great pleasure indeed, as President of the Association, to present him with the medal, which he hoped would be held in his family as an heirloom. He was glad, in a number of ways, that it was going to a member in the South, because he had always a great leaning to that quarter; and he hoped it would be the means of bringing members to the Association therefrom.

Mr. Egan thanked the President for his remarks, and the members of the Association for having decided to award the medal to him. He felt that it should have fallen into more worthy hands than his. He could assure them that it would be a source of great pleasure to him. He would treasure it as long as he lived, and would do so more especially because it was presented by an Association like the North of Ireland Association of Gas Managers.

The medal is of chaste design, cruciform in shape, highly ornamented. It bears on one side the inscription: "Presented to Mr. Pat. Egan, Tralee, for a paper on 'Hydraulic Mains.' August, 1897;" on the reverse side, the inscription: "North of Ireland Association of Gas Managers."

Place of Next Meeting.

The Hon. Secretary stated that in Committee Mr. Llewellyn had spoken, in the name of Mr. C. A. Spear, of Dublin, one of their extraordinary members, who was proprietor of several gas-works in Ireland and the lessee of several Government gas-works, with regard to the place for their next meeting. Mr. Llewellyn and Mr. Auchterlonie had both the pleasure of working under Mr. Spear, and who had sent a request by Mr. Llewellyn, that the Association might hold their meeting next year in some town with which he was connected; and that, if they did so, he would give them a hearty reception, and entertain them royally.

Mr. Llewellyn said the works with which Mr. Spear was connected, and which he authorized him to mention, were Mullingar and Athlone.

The Hon. Secretary said they had been talking of Dublin.

Mr. Llewellyn said that he had no authority to mention Dublin.

Mr. T. Hands (Enniskillen) thought they should go to Athlone.

Mr. R. Ross (Dungannon) seconded Mr. Hands' proposal.

Mr. FRIZELLE proposed Dublin, and the proposition was seconded by Mr. J. O'GRADY (Mountmellick).

A show of hands was taken; and it was decided, by 19 votes to 10, to meet in Dublin.

THE GOLD MEDAL COMPETITION.

The PRESIDENT asked whether the members thought they should offer a gold medal for competition next year.

Mr. A. GIBB (Newry) proposed that they should offer one for another year; and, in order to give the Hon. Secretary time to know what to do, they should make the time for sending in papers the 1st of May next.

Mr. AUCHTERLONIE seconded the proposal; and it was agreed to.

PAPERS AND DISCUSSIONS.

Mr. R. Ross (Dungannon) read the first paper, entitled—

EXPERIENCE WITH PREPAYMENT METERS.

As some of the members may be contemplating the desirability of introducing prepayment gas-meters, perhaps I may be allowed to give my experience with them. In doing so, I would mention that, as far as it has been possible to obtain information, I claim to have as many—if not more—of these meters in use as there are in any works in Ireland. Up to date, I have over one hundred fixed, and more wanted.

We entertained the idea of introducing prepayment meters in the summer of 1896, and obtained samples from about five firms. We determined on using nothing less than 3-light meters. On testing them, we found there were only two firms whose meters we could depend on. Having decided as to the meters, we issued circulars among those whom we expected would respond; and we had applications coming in faster than we expected, or than we could attend to. In our circular, we proposed to put in a service, fix a meter, and put up one, two, or three brackets free of charge; the meter and fixtures remaining the property of the Company, and removable at any time.

We commenced about August to fix the meters; and before the end of the year, we had about sixty at work. From March, 1897, to March, 1898, the gas consumed in these meters amounted to between 300,000 and 400,000 cubic feet. This is not a large quantity; but still it has increased our revenue.

In other places where prepayment meters have been introduced, they charge a small percentage over and above the price to ordinary consumers; but in our case we did not do so. Quite the reverse, as on calculating the gas to be supplied for a penny at the same amount as ordinary consumers paid, there was half a cubic foot over; and we gave this half foot to the consumers. Therefore the prepayment meter consumers have gas this much cheaper than the ordinary consumers.

The cost of fitting up the houses, including compo. pipe, brackets, fitters' time, and service, amounts, on an average, to about 30s., exclusive of meter. In kitchens or halls, we gave a strong wing or mantelpiece joint; and in bedrooms, a neat bronzed bracket, with gallery, but no globes. The smallest compo. pipe used is not less than $\frac{3}{8}$-inch; and, unless asked for, we supply nothing larger than a No. 3 burner. The greater portion of the consumers have invested in an economizer, slipped over the burner. This certainly increases the light; but it does not reduce the consumption of gas.

At first, I had a lot of trouble with the consumers as to the number of hours the pennyworth of gas would last; and one party would say that theirs burned for 6 hours, another $6\frac{1}{2}$, and so on. I was also told by some of the consumers that, unless they got a meter the same as so-and-so, which gave light for two hours longer than theirs, they would abandon prepayment meters. But I found there were two or three of the consumers who were circulating false reports as to the number of hours their meters gave light, in order to annoy those who were discontented; and on this being explained, the trouble ceased. The pennyworth of gas lasts with a No. 3 burner about 4 hours; and with a No. 2 burner, 5 hours.

I had some trouble also with consumers owing to the fact that they would only put in one penny and allow the gas to burn out. Of course, as the valve closes gradually, they were thus, at the latter part of the time, with very little light. But I advised them to put in sixpence or a shilling in coppers; and showed them how to ascertain at any time how much gas was still due to them. Now each consumer knows what he burns weekly, and puts in the box as many coppers on a Saturday as will give him light during the week.

At first I was much troubled with crooked pennies; some nights as many as six of the consumers sending complaints that they had put in a penny, but that the handle would not turn, and they had no light. Of course, I had to go and get the pennies out; and sometimes this was rather troublesome. But the beaten-out penny is worse, as I had to uncouple the meter, turn it upside down, and insert the blade of a knife to get the coin out. However, the consumers are now getting more cautious, and examine the penny before putting it in the meter.

Another trouble I found was that in some of the meters the money-box was not tight up to the sides of the case, and one copper got jammed between the box and the case; another followed, and so on, until the mechanism became jammed, and the box had to be opened to relieve the coppers. But I splayed out the top of the boxes of those that thus troubled us, and made them fit tight to the side of the cases, and thus prevented the coppers jamming.

We have up to the present time removed the coppers quarterly but in the quarters ending December and March, a good many of the boxes are full. I have got as much as 30s. from some of them; and there are a few where I have had to go and take out some coppers and replace with silver, as the pennies have no fall. I believe it would be better to remove the coppers monthly, at least in winter.

I was asked to call on one consumer, who informed me he had put in a half-crown by mistake, and the meter was stuck. I had to disconnect and turn the meter upside down before I could get the coin out. In two other instances, I got a two-shilling piece among the coppers. These had been put in by mistake for pennies; and of course I returned them.

Now that the consumers are getting used to the meters, and taking care about the crooked and beaten-out pennies, there is very little trouble with them; and we have a class of consumers who would not be secured in any other way. They appreciate gas, and not one has given up his supply. With the exception of two or three, they are all new consumers. These two or three were parties who were rather dilatory in paying their gas bills; and they requested to be provided with a prepayment meter. I asked why they wanted them; and they told me that in their case, when the quarter came round, they had some trouble in finding the money for the gas. But they would never miss a penny now and again with the prepayment meter; and when the quarter expired, the money was there in the box for the gas. It is really surprising the number of pennies that are obtained from some boxes, in the houses of the poorer classes. In some instances, they are rather astonished when the money is being counted out of the boxes.

I shall have some more of the meters to fix, as there are more applicants, but not to any great extent. All who have adopted the system are well pleased; and although it adds to the duties of the manager, and leads to him being called out at untimely hours—in some cases to unfix a crooked or beaten-out penny—he is thanked for his trouble. We have added somewhat to our consumption, and are well pleased with the results.

We find no trouble in disposing of the coppers, as between the mill, the factory, and the bank we get quit of them all. But £34 of coppers is no joke to get removed from the boxes, counted, and put away in lots. It takes some time, and involves some trouble.

Since writing the above, I have seen that at the annual meeting of the North British Association of Gas Managers, held on July 28, Mr. Andrew Wilson, of Perth, said there were 1100 penny-in-the-slot meters in working-class houses and lodging-houses in Perth, and that these meters gave the best pecuniary return. Mr. Ballantyne, of Rothesay, said this type of meter had a great future before it; and Mr. T. Wilson, of Coatbridge, said there were 1400 of these meters in use in his town, and that they now gave 28 cubic feet of gas for 1d. Very few of us, at least in inland towns, can give that amount of gas for the penny; but in Coatbridge they can well afford to do so, as I saw not very long ago that they can get coal laid inside the works at 6s. 6d. per ton. Some of us pay that amount per ton as freight from Belfast. The meter is seemingly going ahead in Scotland, as I also see that they are going to introduce it in Paisley. But think of the enormous number of these meters in use belonging to the great London Gas Companies—the Gaslight and Coke Company with 90,000, and the South Metropolitan Company with 72,000, and to each of which is attached a small gas cooker. At one collection they lift over 12 tons of coppers in lorries.

Discussion.

The PRESIDENT said they had heard Mr. Ross's statement as to how he had succeeded with penny-in-the-slot meters. If any gentlemen present were contemplating introducing them, he was sure Mr. Ross would give them any information he could. He (the President) himself had a few of these meters in Portadown; though not so many as Mr. Ross—he wished he had. However, he had somewhere about forty, and he found that the people were very well pleased with them. They gave a little more trouble than other meters, but they paid.

Mr. T. HANDS (Enniskillen) asked the number of feet of gas Mr. Ross gave for 1d., and the cost of putting the meters in.

Mr. ROSS: About 30s. each.

Mr. HANDS said he had tried every maker's meter, and had a number of prepayment meters giving satisfaction. He remembered putting one in for a shoemaker, who would say to his customers: "Just put a penny in this slot, and you will see a bird come up and sing." A good many pennies were got by him in this way, and so he had his gas for nothing. He (Mr. Hands) had had a great deal of trouble with the meters; but he now thought that they were the backbone of the gas industry. The money was in them, and they secured consumers whom they could not get before, because they had not the money wherewith to pay a quarter's bill.

Mr. G. R. LOVE (Dundalk) remarked that Mr. Ross was much more go-ahead than he would be. He found that he had about a hundred meters fixed, and that he supplied compo. pipe, bracket, time, &c., at a cost of something like 30s. each. The Company Mr. Ross represented spent about £150 of capital upon these meters for the sake of getting a few additional consumers. This

might be of little consequence where the population was settled; but if they had a shifty population, it would be a considerable loss, because they might have to remove the brackets. Mr. Ross pointed out that consumers often got half a cubic foot of gas cheaper than consumers with ordinary meters. This was an unusual thing, because nearly all gas companies charged something extra to prepayment meter consumers. He thought Mr. Ross's Company were dealing exceptionally liberally with these consumers; and he did not think that anything that was supplied in this way for nothing was appreciated so much as it would be if they charged a little for it. He did not consider that he would go so far as Mr. Ross in this respect. Like Mr. Hands, he would be glad to know the quantity of gas Mr. Ross gave for 1d. As for his troubles, these also added to his expenses. He had more collections; he had the coppers to take up, which he had not with ordinary meters; and he had the coppers to dispose of. This entailed a good deal of trouble and expense beyond the £150. He thought it was unprofitable thing to go on on the lines laid down by Mr. Ross; and he (Mr. Love) certainly should not like to submit such a scheme to his Directors.

Mr. T. Frizelle (Holywood) said Mr. Ross's experience had been a very instructive and interesting one. Anything which tended to increase the consumption of gas would be hailed by every gas manager. The prepayment meter had been a great boon to them, as well as to consumers who were not in a position to pay quarterly accounts. In the first place, it removed the cause of accident in the matter of oil lighting, which had led to so many deaths; and it furnished a light on easy terms. The Company he had the honour to serve introduced prepayment meters about twelve months ago. They also held an exhibition of gas-stoves. The result had been very satisfactory. They had eighty slot meters in use; and almost all the consumers who used them were new, having been previously oil burners. The consumption of gas with each of these meters had been about 7000 cubic feet, and they had not been working for a full year. The price was the same as was charged by Mr. Ross; and they gave 20 cubic feet of gas for 1d. His Directors had also resolved to pay for the brackets, as well as the service-pipes put into all houses the valuation of which did not exceed £8. He could assure the members that these meters were the means of bringing gas within the reach of consumers they would not otherwise have. They, as managers, liked augmented consumption; and so did their Directors, for the reason that the profits were increased, which was a sign of progress. From the 80 meters he (Mr. Frizelle) had, they had lifted £110 5s. Mr. Ross did not lift so much with his. He had no reason to regret putting in prepayment meters; and his Company were recovering any expenses they incurred in connection with them.

The Hon. Secretary said he felt the members were very deeply indebted to Mr. Ross for bringing the subject of prepayment meters before the Association. He would very much like some of those who had not had experience with prepayment meters to ask questions of Mr. Ross, because he was sure they had been thinking about these meters, and there might have been difficulties in the way which prevented their adopting them, and things might have occurred to them which Mr. Ross, or some others who had had experience, might be able to clear away. His own experience agreed to a large extent with that of Mr. Ross, though he had not pushed the thing as that gentleman had done. He had had too much to do, for one thing; and for another, he had often been uncertain in regard to the policy, which had been disputed, of fitting up houses for prepayment consumers. He had not attempted anything of the sort. He treated these consumers just as he treated ordinary ones. The Company put in the service-pipe through the wall, and supplied them with a slot meter. The people themselves connected this with the service, and laid what pipes and fittings they wanted, and had the gas at the same price as the other consumers—22½ cubic feet for 1d. They had experienced some of the troubles about which Mr. Ross had spoken. The crooked penny was an awful nuisance. Sometimes he had to send a meter back to the maker because he could not get the penny out. He had never found a paper disc in a prepayment meter; but he had had soda-water capsules beaten out. The finding of one of these things led to a row or a threat that the meter would be taken away. A prepayment meter was not in the same position as an automatic machine at a railway station, because, in the case of the meter, they knew who put in the bad coin. He had only about 45 penny-in-the-slot meters in use; and the average return from them was 30s. or 32s. a year. Last year, he had £78 out of 44 meters. He found that the average number of these meters in use kept about the same. After they had had a customer for some time with a slot meter, and found he was doing right, they occasionally gave him an ordinary meter; but then somebody else would possibly be applying for a slot meter. People did not go to the expense of fitting up their houses for the use of gas without having made up their minds to burn it; and when once they had incurred the expense, they would think twice before they gave it up. In getting a number of new consumers, they had not to look at the £150 they expended to secure them, but to the million or so cubic feet more gas which they would sell in a year. Beyond this, there were staff expenses which did not increase with the quantity of gas produced. The cost of the extra gas made was little more than the price of the coal. They could therefore well afford to supply the gas cheaper, even in the first instance, because they were bringing in a new set of customers. He thought there were two ways of looking at this question. While Mr. Love might be very clear in his opinion, there was plenty to be said on Mr. Ross's side too; and he believed that if the latter gentleman found it pay him, he would not care very much what others might say.

Mr. E. Stears (Lisburn) said he had found it to be a very great drawback that he could not furnish a supply of gas without a deposit; but prepayment meters obviated this. He gave 20 cubic feet for 1d., and sold gas by ordinary meters at 3s. 6d. per 1000 cubic feet, which was practically the same. But the great advantage of the prepayment system was that, if there were fittings in the house, the consumer had a slot meter put in free. He did not go past the meter. These meters gave him no trouble. One or two pennies might stick; but this was a trifling matter.

Mr. Love said he forgot to mention that he had a great number of prepayment meters attached to cooking-stoves, in the use of which they were a great help. He supplied gas for cooking, heating, and motive power at 7½d. per 1000 cubic feet less than for lighting; and he had separate services.

Mr. A. Gibb (Newry) thought prepayment meters were a very useful adjunct to gas-works. By them a manager could get at a class of consumers who never could be reached otherwise. As had already been said, there was a difficulty in getting 5s., 10s., or 15s. at the end of a quarter; but they could obtain far more than this by the prepayment meter. People were in the habit of buying a pennyworth of oil, and never thought of the penny—it was the come-at-ableness of the thing they thought of. It was not so with 5s. or 10s.; but people dropped a penny into a prepayment meter now and again, and the consequence was that, in small greengrocery and the like establishments, they would now go in for a very large supply, and by this means they considerably increased their consumption. He had only had prepayment meters for two years and a half; and he had never canvassed anybody to take them in. The first half year he sold 47,409 cubic feet by two or three of them; the next year it was 121,767 cubic feet; and last year, with 32 meters, he sold 1,085,395 cubic feet. So that they were going quietly along, and were substantially increasing their consumption. Moreover, they were not asking anyone for a deposit. They connected the meter, and the consumers did all the inside fitting themselves. He thought that if gas managers were to try to cultivate the introduction of penny-in-the-slot meters, they would find that they would lead to a large additional consumption of gas. He had, on two occasions, found a two-shilling piece instead of a penny. He had very great satisfaction in testifying to the worth of the paper Mr. Ross had brought before them.

Mr. Stears mentioned that the man he sent out to collect the money took with him a bag for every meter, into which he put the money, and did not count it before the consumer. He thought this was a very good plan, because they might think they were consuming too much gas if they saw how much money there was.

The Hon. Secretary, Mr. Gibb, the President, and Mr. Hands remarked that this was their plan.

Mr. Ross, in reply, said Mr. Love complained about giving half a cubic foot of gas by way of abatement; but his object was to increase his consumption. About six tenants who had prepayment meters in his place had shifted; and the houses they left had been more readily taken because the gas-fittings were all in. He did not charge meter-rents, for either prepayment or ordinary meters. He gave 15 cubic feet of gas for 1d., which came out at about 5s. 6⅝d. per 1000 cubic feet. It was a point in his favour that in some houses, where they would not give perhaps 10s. for all that was in the place, they might now get 15s. for gas. He was perfectly satisfied. He had increased his consumption, and expected to increase it more. He had one cooker attached to a prepayment meter, and possibly by next year he might be able to tell them something about the application of prepayment meters to cookers.

The President expressed his pleasure at the interesting discussion they had had. He pointed out that one thing which they had all forgotten to mention was that if they had a consumer using an ordinary meter, and had any difficulty in getting money from him, they could simply put in a prepayment meter, and then they would get their money down. He gave 20 cubic feet of gas for 1d. It should really be 22 feet; but the meters cost a good deal more, and they had to charge accordingly.

Mr. A. Gibb (Newry) read the following paper:—

The Workmen's Compensation Act, 1897.

The 1st of July, 1898, will be long remembered by those who are engaged in the manufacturing and mechanical industries of the three kingdoms as the day on which the Workmen's Compensation Act of 1897 came into operation. Its framers cannot be blamed for loquacity or want of incision in every detail of the measure. It has only ten sections, with their sub-divisions; and, leaving out the two schedules, it occupies only six pages. Yet within this small compass great issues are comprised. How the Act will operate on the various industries of this country is a subject of pure speculation. If employer and employed work in friendly agreement, much heart-burning and jealousy will be avoided, and freedom of action will ensue; and the sound of the hammer and the shuttle, and the roar of steam, will make

glad the inhabitants of the land. In introducing this subject to your notice, my object is to elicit your opinions on this important measure, the scope of which I will briefly indicate.

Section 1 states that compensation must be given for any accident causing personal injury, if of more than two weeks' duration. The only disallowance that can be claimed by the employer is where "*serious and wilful misconduct*" on the part of the workman can be substantiated. But here a difficulty arises. What constitutes an accident? And what is contributory misconduct? Sir R. T. Reid, Q.C., M.P., in the case of the Lancashire and Cheshire and North Wales Miners' Relief Societies, defines an accident as "an occurrence out of the ordinary which produces death or disablement from work." There must be some casualty or special occurrence. Death or disablement not produced by a particular occurrence to which one can point, is not a case of "accident" within the rules which have been framed under the Act. And even if a particular occurrence can be indicated as a cause, there is no accident if it is "something which comes in the ordinary course in the work the man undertakes." In most cases, an "accident" is accompanied by something in the nature of violence—a fall, a blow, or an explosion. However nicely one may adjust the definition of the word "accident," there will always be cases on the borderland.

Sub section 2 (*c*) sets forth that if it is proved that the injury to a workman is attributable to the "serious and wilful misconduct of that workman," any compensation claimed in respect of the injury is to be disallowed. This sub-section will form the framework of all litigation under the Act, as the difficulty will be to define "serious and wilful misconduct."

Section 2 specifies the time of notice, and explains how one is to proceed in different cases. There is a limit to the time of recovery under the Act. Notice is to be given as soon as practicable, and before the workman voluntarily leaves his employment; and the claim for compensation must be made *within* six months—in the case of death six months from the time of death. "Months" here means calendar months.

Section 3 indicates the duties of registrarship. Where the employer wishes to contract out of the Act, the scheme is to be laid before the Registrar of Friendly Societies for his approval or rejection, according as the terms are better or worse than the provision of the Act. While the Bill was passing through the House, great stress was laid upon a scheme of mutual agreement between the employer and the workmen.

Section 4 deals with sub-contracting, where the undertaker becomes liable for all accidents. It is enacted by sub-section 3 that the section "shall not apply to any contract with any person for the execution by or under such contractor of any work which is merely ancillary or incidental to, and is no part of, or process in, the trade or business carried on by such undertakers respectively"—to wit, the erection of gasholders or other appliances connected with gas making.

Section 5 stipulates that compensation to a workman is not to be affected by bankruptcy, but is to be a first charge on the estate.

Section 6 provides that, in cases where legal liability may rest on some other person than the employer, the workman may elect to proceed against that person; but two actions cannot be taken on the one case. If the employer should have to pay compensation under the Act, he is to be entitled to indemnification by the other party.

Section 7 sets forth the employments to which this Act applies; gas-works being included in the section.

Section 8 exonerates persons engaged in the naval or military service of the Crown.

Section 9 declares contracting out of compensation existing at the commencement of the Act to be void.

Section 10 specifies that the Act may be cited as the Workmen's Compensation Act, 1897.

The foregoing is a bare outline of this important Act. Why the conductors of gas-works, with which we are immediately concerned, should be called upon to pay the increased rates of insurance for their workpeople demanded by the various Insurance Companies is a puzzle to me. If we take the accidents which have happened in connection with gas-works, and compare them with other industries, there is a very clean sheet presented on their behalf. Of course, the Insurance Companies wish to protect themselves; and they are perfectly right in doing so. But their demands at the present time are exorbitant, and out of proportion to the risk; some of them quoting 25s., and others different rates down to 7s. 6d. per £100 of wages paid. Those of you who read the technical papers will have seen the various insurance plans proposed; and therefore I need not take up your time in dealing with them. Mr. Chamberlain says the object to be attained by the first clause of section 3, where reference to registrarship is introduced, is that "we do not wish to prevent a workman doing better for himself, by the consent and with the goodwill of his employer, than legislation can do for him." If you will refer to Vol. LXXI., p. 1328, of the "JOURNAL OF GAS LIGHTING," you will find the report on the first six months' working of the accident fund of the South Metropolitan Gas Company, where full details are given. I have no doubt that, after the Act has been in operation a year or two, Insurance Companies will have obtained data to enable them to reconsider and greatly reduce their present high charges.

And now, in conclusion, I have only to express the hope that it may be a long time ere the company or the corporation of any gas manager will be brought within the grip of the Workmen's Compensation Act of 1897.

Discussion.

The PRESIDENT said that none of them had had any experience of the Workmen's Compensation Act; and it was to be hoped it would be a long time before they had any. Had the members anything to say upon it.

Mr. G. R. LOVE (Dundalk) was sure they were all indebted to Mr. Gibb for bringing the subject before them. It was one which interested every gas manager. He had no doubt but that a great many of them had been considering the question—they had been forced to do so, owing to their position under the new Act. Previous to the last meeting of The Gas Institute, his Directors had been considering the matter; and they had asked him to keep his ears open, in order that he might be able to give them guidance upon it. The discussion which took place at The Gas Institute meeting, upon the paper by Mr. Ellery, to his mind, fully opened up the subject. It gave him one or two good hints in the matter. One gentleman—he forgot his name—advised them not to insure under the whole Act, and said he considered that if they covered themselves against risk from fatal accidents only, for twelve months, by that time the Insurance Companies would have settled down, and it would be better known what the amount of their charges should be. After he got home, he turned up the file of the "JOURNAL OF GAS LIGHTING;" and he had made a list of all the accidents reported for the year 1892. He found that the number of deaths which occurred during the twelve months from accidents in gas-works that were reported was 18; the number of serious injuries was 8; and of slight injuries 10. He could give the details, if they were asked for. Considering the number of men employed in gas-works, this was a very slight list; and the gentleman who advised them to cover against deaths only, gave them good advice. He therefore recommended his Directors to insure only against fatal accidents. They effected an insurance of this sort, for a premium of 5s. per £100 of wages paid. Down till this year, they had been insured under the Employers' Liability Act and at common law, at a cost of 2s. per £100 of wages. His Directors thought it would be a wise thing to continue the old policy; and so they were now insured under all forms of liability. He had been seven years in Dundalk; and he had never had an accident of any kind. He supposed that nearly everyone present could say the same of accidents. He had asked himself why it was that the Insurance Companies were seeking such a high premium as 25s. per cent. Some Companies reduced this to 12s. per cent.; but they reserved certain things which might have made almost inoperative any policy at that rate.

Mr. T. HANDS (Enniskillen) said that it might be well for them to ascertain, first, whether the Act applied to them. He believed that men who were employed laying mains, and the like, did not come under the Act. He had been seven years in Enniskillen, and had had no accident; though, of course, he could not say how soon he might have one. But why should they be compelled to pay exorbitant rates? Owners of gas-works should combine, and should set aside a small percentage upon the wages they paid; thereby letting the Insurance Companies see that they could do without them. He believed then that in a few months the rates would be reduced, and they would be able to insure their workmen without paying unreasonable rates.

The HON. SECRETARY said that Mr. Hands had just struck the question which was in his mind. He did not know, one way or the other; but suppose they were not under the Act. It was, he thought, important that they should have some information upon this; and he had been waiting for the meeting to see if any would be forthcoming. The Act said that whatever works it applied to must be works where steam, water, or other mechanical power was used. He could understand, with reference to large gas-works, where mechanical power was used for the handling of coal, coke, and the like, that they should come under the Act. But there were many small gas-works, in which there was no mechanical power, not even an exhauster; and the question was whether these were not entirely outside the Act. Then there were gas-works in which the exhauster was often idle during the summer. Would these works be within the Act when the exhauster was working, and outside when it was idle? But there were, in addition, many gas-works in which manual labour only was used. It was a question whether they were, or were not, within the limits of the Act. The position of his works was such that they suffered severely in storms. Almost every storm damaged their roofs. If a slate were to fall upon a man and hurt him, what would that have to do with mechanical power? and why should it bring them within the limits of an Act of Parliament like the one in question? It was quite right that they should pay for the protection of their workmen; but it seemed to him to be hard that they should be called upon to pay such an exorbitant sum as the Act stipulated. It said that they should pay nothing less than £150, or three years' wages when they went over that. The accidents at his works were very trifling. He had been fifteen years at Armagh; and he had never had an accident which would come under the Act. He brought the matter before his Directors; and they told him to do what he could. He informed them that the Gas Associations were looking into the matter, and wanted to see whether something could be done, by mutual

insurance or otherwise. Before he sat down, he wished to remind them of the communication from the North of England Gas Managers' Association. They might pass a resolution upon this communication; and he thought they could not do better than work in harmony with other Associations.

Mr. P. HURLL (Glasgow) said that this was a subject which had given the people in his trade a great deal of trouble. The wages which they paid amounted to about £16,000 a year. They commenced to make inquiries as to what the rates of insurance on this sum would be; and they found that it would be 30s., or at least 25s., per cent. They discovered that there was a combination among some Insurance Companies. They held out for a little, and found that there were some other Companies, outside the ring, who were trying to secure the business at much lower rates. At a meeting of the trade which was held they considered whether they should not join together and run a small mutual insurance company. Then they had an offer from a firm of accountants in Glasgow, offering a rate of only 10s. per cent. They held another meeting, which was attended by eight or ten firms, paying a good round sum of wages; and they said "No; we will form a mutual society rather than pay these rates." So the matter was really left in his hands, to do the best he could for the whole of the firms in the trade. He thereupon obtained a quotation of 7s. per cent. for all their above-ground workers, and of 9s. per cent. for underground workers. They considered these very moderate rates indeed; and they closed for about eight or ten different concerns, on these terms. Their previous rates were about 3s. 6d. per cent.; so that they were now about double what they previously paid. It was the Ocean Insurance Company they insured with; and the accountants who were acting for them said it was only experimental, and that possibly at the end of the year the rates would be reconsidered, perhaps reduced. He did not think that because in gas-works mechanical power was not employed, their owners were relieved of responsibility. If they considered the case of a quarry, where there might be no mechanical power, but where the stone was being carried out in a hand-barrow, the owner was liable.

The HON. SECRETARY: But a quarry is specifically mentioned in the Act.

Mr. HURLL said if they took the case of a builder, if a scaffold gave way, and a man fell with it, the builder would be liable. He thought that, if gas-works owners were depending on getting clear of any claims under the Act, on the ground that they had no machinery, they would find they were making a mistake.

Mr. J. W. AUCHTERLONIE (Mullingar) said he believed that the only occupations which were left out would be agricultural labourers, seamen, workshop workers, and builders under 30 feet high. He approved of the mutual insurance system, because, if premiums were found to be too high, they would be reduced next year. He thought they, as an Association, certainly ought to support the North of England Association. He moved that they support the idea of mutual insurance, unless they were offered more favourable terms.

Mr. T. FRIZELLE (Holywood) supposed that, as managers of gas-works, they had no authority, as delegates to the Association, to speak for the owners of the works. The Company he represented had insured at 12s. 6d. per £100 of wages. They thought it was better to do this in the meantime, and to see how the Act would work.

Mr. T. LLEWELLYN (Newbridge) thought that the question of gas-works proprietors coming within the operation of the Act or otherwise, was one which was a little beyond their debating powers, as gas managers. It was purely a legal question, which would have to be fought out in a Court of Law, if an accident occurred in their works. Then they would probably learn, with some practical and unpleasant results, that gas undertakings were liable for any injury which might be sustained by the men in the works. Personally they were not much interested in this responsibility, because they were servants of the gas company, and not proprietors of the works; but really, he thought, it would be an erroneous idea to go forth from the meeting, that they considered there was no liability for injuries in gas-works, or that they had no cause to regard the Act as binding upon them.

Mr. LOVE said he was not certain, from memory; but he thought that at The Gas Institute meeting it was stated that legal opinion had been obtained, to the effect that they were under the Act.

Mr. S. B. LANGLANDS (Coleraine) said that immediately after he learnt what The Gas Institute had to say in the matter, he brought the subject before his Committee; and they thought it wise to insure. They had done so, at the rate of 20s. per £100. They obtained Counsel's opinion in the matter, and were advised that they were liable under the Act, for any person in the works—even the employee of a sub-contractor.

Mr. LOVE suggested that, as they had not any authority from their companies, they should, in the meantime, thank the North of England Association for their communication, and inform them that, while they had discussed the subject, they were not at present in a position to come to any decision upon it.

This was agreed to.

Mr. GIBB, in closing the discussion, said he had made an effort to explain and define the penal wording of section 1. Compensation for injury sustained by a workman might be viewed under three heads—first, as it stood in common law; secondly, as the Employers' Liability Act of 1880 affected the common law rights (43 & 44 Vict., cap. 42); and, thirdly, as it stood on a new basis by the Workmen's Compensation Act, 1897. Legislation had been progressive since the reign of George III. The Mines Regulation Act, 1872, the Factory Act, 1878, and the Employers' Liability Act, 1880, culminated in the Workmen's Compensation Act, 1897. The Act of 1880 implied more generous treatment and conditions of employment; while the Act of 1897 *compelled* their adoption, and imposed new duties and obligations on the employer. "Personal injury" meant physical injury to person, and also injuries to the health. But, surely, where disease was caused by the action of a known natural agent it could not give rise to compensation. The word "accident" had already been defined. Thomas Bevan, B.L., afforded another as follows: "An occurrence which could not have been avoided by the use of the kind and degree of care necessary to the exigency, and in the consequence." He also gave two tests applicable in ascertaining whether an occurrence were an "accident" or not: "Was the result contemplated?" and "was the result the ordinary and natural sequence of the course of action preceding it?" If an "accident" arose out of the employment, or occurred while the workman was engaged in it, he was entitled to compensation under the Act, even though it was found to be due to the misconduct of a stranger. Section 6 regulated this right of the workmen. The converse of this, surely, ought to be equally applicable, and should constitute a "wilful" act. If the stranger or fellow-worker took the occasion of the workman being engaged in the employer's work to injure him by a wilful act, though the injury should happen while the workman was engaged in the employment, the injury would not "arise out of nor be in the course of the employment." The civil liability of the employer was either at common law or under the Employers' Liability Act, 1880. As to "serious and wilful misconduct," contributory negligence could not be set forth as a defence. "Wilful" meant that the person knew what he was doing, and intended to do what he was doing, and was a free agent. "Serious" had not yet been defined or decided by any tribunal; but, in plain terms, it signified that which was grave, weighty, earnest, and important, in opposition to what was trifling and unimportant. Serious misconduct demanded attention, and could not be passed over. That which constituted serious and wilful misconduct was a subject of grave importance and rested to a great extent for the Arbitrator. (See Second Schedule, provision 4.) The Secretary of State might appoint legally qualified medical practitioners, so that any workman receiving weekly compensation, must, if desired, submit himself for examination to the medical practitioner. Should he refuse, the compensation would cease till such examination had taken place. (See First Schedule, Rules 11 and 12.)

MR. AUCHTERLONIE ON STANDARDIZING METER-UNIONS.

Mr. J. AUCHTERLONIE (Mullingar) read a paper on "The Standardizing of Meter-Unions," which contained the following passages: In the month of February last our Association (in common with kindred institutions throughout the United Kingdom) was asked by the North British Association of Gas Managers to co-operate in the standardizing of meter-unions. Our Committee unanimously approved of the proposal; and this being our first meeting since the receipt of the communication, I have been asked to introduce the subject for your consideration. But really so much has been said in favour of the proposed standard connections, and so little against them, that it would be almost useless for me to reiterate what has already been advanced by all grades of gas managers. . . . Those of you who were at The Gas Institute meeting will remember that the proposal was very favourably received, and ultimately left to the Council of the Institute to deal with. I have not much more to say, except that personally I approve very strongly of the proposed standard unions. It has been one of the many inconveniences that gas managers have had to contend with, especially managers of small gas-works. Another matter which ought to be taken in hand is the reduction of the infinite variety of retorts that are in use. Meantime, our thanks are due to Mr. Myers, and to the North British Association for what they have done in the matter; and I think that we to-day may safely agree to leave the matter to the Council of The Gas Institute, and heartily support them in carrying the object to a satisfactory termination.

Discussion.

The PRESIDENT said this was a very important subject. It would save them a good deal of trouble and annoyance in changing meters, if they had standard sizes for meter unions. He thought it was a matter which might be very easily settled. If the various Gas Associations could make up their minds to agree upon what they wanted, he believed the meter makers would give them meters all with similar couplings.

The HON. SECRETARY said he thought it was of great importance that they should have all gas-meter unions of the same size, especially where they had no gasfitters in their employment, because they would then be able themselves to remove a meter and put on one by another maker.

The PRESIDENT thought that if the matter were in the hands of The Gas Institute, and they intended to take some definite action, their Association should adopt a resolution which would

strengthen the hands of the Institute. They should, he thought, fall in line with the others, and support them in the matter.

Mr. G. CUMMINGS (Ballymoney) said that, like all subjects, this required to be looked at from both sides. It would do good in one way, but it might not in another. He had himself, rather than take out a coupling, altered the meter to suit it; and he had found this to be as useful as altering the coupling.

Mr. T. LLEWELLYN (Newbridge) thought that while they were agreeing to fall in with the standard unions for meters, it would be well that it should go forth from them, as an Association, that they would prefer to have longer linings for the larger sizes. Of course, they all were agreed on the principal idea—having the same sized couplings, so that meters might be interchangeable; but he believed that a little suggestion, such as he had proposed, would not be out of place.

Mr. S. B. LANGLANDS (Coleraine) said he had much pleasure in moving that they, as the North of Ireland Association of Gas Managers, express their gratification at The Gas Institute having taken up the subject of standard unions for gas-meters, and that they agree to support them in it; adding Mr. Llewellyn's suggestion as a rider.

Mr. A. MACKENZIE (Edinburgh) said they would find that, if they went in for finality, the meter makers would be pleased to do what they wanted.

Mr. A. GIBB (Newry), in seconding Mr. Langlands' motion, said that there had been discussions about going to the Board of Trade on the subject. He thought it was a matter which was altogether outside the jurisdiction of the Board of Trade. The Board of Trade had only to deal with capacity to measure. If the various Associations were pleased, the meter makers could adopt the uniform set of unions; and this would facilitate matters very much. He thought, also, that they should thank Mr. Auchterlonie for having laid the matter before them.

The motion was adopted; and Mr. AUCHTERLONIE returned thanks.

THE LUNCHEON.

At the conclusion of the discussion on the first paper, the members adjourned to the Town Hall, where they were entertained to an excellent luncheon by the Directors of the Portadown Gas Company. Mr. A. Thornton, the Chairman, presided, and, on behalf of the Company and of the community of Portadown, gave the Association a very hearty welcome, and thanked them for their visit to the town.

VOTE OF THANKS TO THE PRESIDENT.

The HON. SECRETARY, at the conclusion of the proceedings, proposed a hearty vote of thanks to the President, for his conduct in the chair.

The PRESIDENT thanked the members for their kind expression and vote. He said he was willing to do anything he could for the Association at any time. One thing he was sorry for, and that was that they had not had the presence of Professor Ivison Macadam. It was a great loss to them that they had not heard his lecture. There was another paper on the *agenda*, by Mr. Fitzsimmons, which they had not been able to take up for want of time.

This concluded the proceedings.

EXCURSION TO LOUGH ERNE.

On Wednesday, the members of the Association and lady friends travelled by rail from Portadown to Enniskillen, where they became the guests of Mr. D. D. Macpherson, of Manchester, one of the extraordinary members of the Association. A hurried visit was paid to the Enniskillen Gas Company's works, where they saw some of the astonishing appliances which the Manager (Mr. T. Hands) employs in the production of gas. They then joined the steam yacht *Widgeon*, which, by the way, was built, or rather rebuilt, by Mr. Hands, and is now a remarkably comfortable boat. Upon it the party were conveyed, amid the beauties of the incomparable Irish Lough Erne, to Little Paris Island, one of the gems of the loch, which is owned by Mr. Hands, and which has this year been occupied by Mr. Macpherson for some months as a holiday resort. Mr. and Mrs. Macpherson gave their visitors a hearty reception, and treated them right royally in a spacious and beautifully decorated banqueting hall on the island. Dinner over and a cordial vote of thanks having been accorded to their host and hostess for their hospitality, a cruise of an hour's duration was enjoyed among the islands in the neighbourhood. A return visit was paid to Little Paris Island, where a hasty tea was served. The party returned by the yacht to Enniskillen; Mr. and Mrs. Macpherson travelling with them, and seeing them off by train. As regards the whole gathering, it may safely be said that the North of Ireland Association have reason to be proud of it, whether as regards the quality of the technical matter discussed, the excellence of the feeling which prevailed, or the happiness which characterized the whole. It is beginning to be realized that the North of Ireland Association has surmounted the struggles of its earlier years, and is now a fit colleague of any of the older and more powerful Associations on this side of the Channel. For this, it is acknowledged on all hands, the chief credit is due to the labours of the indefatigable and imperturbable Hon. Secretary, Mr. J. Whimster, of Armagh.

THE "COWAN PRESSURE SYSTEM."

By J. HEPWORTH, of Edinburgh.

[A Paper read before the North British Association of Gas Managers, July 28, 1898.]

What is known as the "Cowan Pressure System" was introduced a few years since; and, as there may be some who are not acquainted with its objects, the writer, when applied to for a short paper, decided to offer a few notes thereon. The system having already been described in one or more of the technical journals, and having been treated of in a valuable paper on "The Automatic Regulation of Pressure in the Distributing Mains," read before The Gas Institute in 1897,* any detailed description of the apparatus is probably unnecessary.

The governor for regulating the pressure of gas, as is well known, was devised and first employed by Mr. Clegg, in conjunction with the first gas-meter. Shortly after its introduction (the governor having assumed a more practical form), it was adopted for regulating the pressure at which gas is delivered from the gasholder into the mains supplying the town. The gas-governor, when properly constructed, has been found to answer its purposes so well that it has probably never occurred to many of those using it, that any future addition to it for improving its efficiency would be either necessary or practicable. The "Cowan Pressure System" is not a governor. It is an adjunct to the governor; and by its instrumentality the pressure of gas in the town or in a certain district is perfectly controlled and automatically maintained. It performs a duty which has not yet been performed by any governor.

The gas-governor in common use requires attention whenever an increase or decrease of pressure is necessary. If the governor is to be of any service, the bell must be loaded or unloaded as the consumption of gas increases or decreases at intervals during the twenty-four hours of the day. The necessity for altering the load is due, not to the necessity for any increase of pressure in order to secure the perfect combustion of the gas, but solely to the inadequacy of the carrying capacity of the mains. The mains are always more or less inadequate to convey the requisite quantity of gas during the period of greatest consumption; and they must always be so. Therefore the loading and unloading of the governor is obviously necessary. The operation of loading and unloading is usually effected by hand; and, provided that this operation is always attended to at the right time, and performed to the required degree, the results ought to be fairly satisfactory. But what is the right time is not easily ascertained; nor is it possible always to settle upon the requisite degree. Arrangements were devised more than 20 years since for increasing and decreasing the pressure mechanically. This was effected by the aid of clockwork; and it has been found a successful method up to, and within, the limits of its powers. All the attention required by this system was the winding up of the clock attached to the pressure changer, and the adjustment of this changer once a week, so as to increase or decrease the pressure to whatever extent, and at whatever time, it might be desired.

Whether the load is applied manually or mechanically, the pressure, be it remembered, is fixed and controlled in the governor house. Is this the most satisfactory point from which to regulate the pressure? Are we not all familiar with occasional complaints, perhaps not of bad gas, but of a defective supply of gas or an inadequate pressure in some part of the district supplied? What have we done to remedy the complaints? Probably, in some instances, we have appealed to the pressure register; and, if we have found that the registered pressure at the outlet of the governor was the same as usual, have we not folded our hands and concluded that there was no ground for the complaint? Or, if we have had any doubt in the matter, we may have concluded that a permanent increase in the pressure would prevent future complaints; and we have taken steps to secure this. In either case we may have come to the wrong conclusion; for there may have been an actual deficiency of gas for a time in the district from which the complaint was received—a deficiency arising from some unusual local demand. Such unusual demands do arise, and may be caused by a dense fog, or by a sudden, a temporary, and a somewhat erratic demand for gas, either for lighting, cooking, heating, or industrial purposes. A sudden deficiency in the supply of gas in a remote district is not immediately, and never fully, made known at the gas-works; and as the governor cannot of itself supply the additional load which would enable it to respond to the increased demand, the deficiency is probably never known at all until after the demand has ceased In such a case, therefore, the complaint of a deficient supply is well founded. But to remove all cause for such a complaint, there is no necessity to increase permanently the pressure of gas at the outlet of the governor. Indeed, this probably would, in its turn, prove as inefficient, as it certainly would prove an undesirable, remedy.

Now, it is at this point that the "Cowan Pressure System" comes in. The principle of this invention consists in "automatically regulating the loading and unloading of gas-governors by the pressure of gas in the main of a district remote from the governor." If this principle is the correct one to apply in the

* See "JOURNAL," Vol. LXX., p. 26

distribution of gas, then it follows that the governor is after all not the most satisfactory point from which to regulate pressure; and that, as a matter of fact, it is impossible to regulate the pressure at the governor so as to afford an adequate supply of gas under all the varying circumstances that arise. Whatever form of governor is used in connection with this apparatus, it is more convenient to employ water as the loading medium. The apparatus* includes: (1) The pressure vessel. This consists of a tank and float-bell or small gasholder balanced by the gas pressure and placed in any convenient building wherever (after examination) it is found that the pressure of gas is lower than in any other part of the district. This pressure vessel is connected with the gas-main by a short length of pipe. (2) An electrical apparatus fixed in the governor house, for operating the valves which load and unload the governor bell. (3) A water-tank constantly supplied with water through a ball tap. (4) The necessary wires connecting the pressure vessel and the electrical apparatus referred to. [A more complete description of the apparatus is added as an appendix.]

The apparatus being fixed and in operation, what occurs? The pressure may be whatever we determine; but we will assume that it has been determined that the minimum pressure of gas should be 12-10ths in the district where the pressure vessel is fixed; and that the apparatus has been adjusted to give this pressure. What occurs when a heavy and sudden demand for gas arises in the district? The pressure of gas is immediately reduced to something below the 12-10ths fixed upon. That, so far, is precisely what would have occurred if there had been no pressure vessel at all; and it is precisely what does occur wherever the pressure system is not in use. But, immediately the bell of the gasholder falls, the valves in the governor house are operated electrically, and the load upon the governor is at once restored so as to give 12-10ths. In the same way should the pressure in the remote district ever exceed 12-10ths, the valves are again operated electrically; but this time with the result of promptly decreasing the pressure again to 12-10ths.

The writer, having had the system in use when he was engaged in the management of gas-works, is able to say from experience that no instrument could act with greater precision and accuracy in effecting the purpose for which it was designed. To an Association whose members are always ready to appreciate whatever methods are introduced for improving either the manufacture or distribution of gas, it can scarcely be necessary to enlarge upon the advantages of the pressure system now briefly referred to. It secures a constant and efficient pressure in the district where the pressure vessel is fixed, and this ensures a sufficient pressure over the whole district supplied. The pressure is obtained without personal attention, and with the certainty that, however irregular the demand for gas may be, the instrument will promptly and satisfactorily meet it. The apparatus will be found to reduce the average pressure at the outlet of the governor; and, when the pressure is increased, it will only be for so long a time as is necessary. The consumer will always get a sufficient quantity of gas, however, and whenever his requirements may vary. A reduction in the unaccounted-for gas will naturally follow. The necessity for a costly expenditure in larger mains may, in many cases, be avoided. No governor known to the writer is able to secure the results obtained by this invention.

It is quite possible that some objections to the system may have arisen in the minds of some persons, and some of these may be anticipated.

The present system of controlling the pressure from the governor is sufficient.—It has already been pointed out that, under the present system of controlling the pressure of gas at the governor house, no provision whatever exists for increasing the pressure in response to any unusual and increased demands for gas which may arise in certain parts of the district, and however occasioned—all of which may be unknown at the governor house; or, on the other hand, for the immediate decrease of pressure when this demand ceases. Further, it is found in practice that, where "Cowan's Pressure System" is in use, the pressure is frequently not required until a later time than had been previously supposed, and is, therefore, not put on so early; and also that it is often unnecessary to keep on the pressure as long as had been thought necessary, when it is therefore taken off earlier.

The results secured by the "Pressure System" could be secured by simpler means.—No such means are known to the writer.

Self-loading governors may do the work this system does.—Those who hold this view overlook the conditions of the problem to be solved, and cannot be acquainted with the principle on which the action of "Cowan's Pressure System" is based. The sympathies of self-loading governors are local, and do not extend far into the district. Consequently, changes of pressure occurring, it may be, miles away from the governor meet with little or no response. As no change of the governor pressure can precede a change of load, and as a change of load can only be ensured by comparatively local influences, it follows that the supply to remote districts is, in the case of self-loading governors, dependent on nearer districts, instead of nearer districts being dependent upon remote districts, as is the case with the Cowan system. It is simply impossible that any self-loading governor can do the work this system does, because the latter is in constant touch with the necessities of the worst supplied part of the district, and maintains a constant and unvarying pressure there. This pressure may, of course, be of any required degree, and may be changed when required without any difficulty or loss of time. In this way the whole of the district is fully provided for at all times and under all circumstances.

If a constant pressure be maintained at the lowest level or worst supplied part of a district, the pressure in the high levels during the heavy consumption will be greatly in excess.—Now, if it be necessary during the heavy consumption to give, say, 12-10ths pressure at the lowest level, and, in giving this 12-10ths, it requires that 30-10ths or 35-10ths pressure be given at the governor, it will at once be admitted that the higher pressure on the higher levels is inevitable if the pressure of 12-10ths is to be maintained in the lower district, and is precisely the same pressure whether put on by hand or by this system; the difference being that, under the "Pressure System," every consumer will get his gas at a sufficient pressure, whereas under the ordinary system this, if not impossible, is, to say the least, doubtful.

The employment of electricity to bridge the distance between the pressure vessel in the district and the governor in the gas-works may be urged as an objection. Electricity is, of course, not the only means of communication that has been and may be employed under this system; but it has been found to be the most convenient as well as the most effective. It may have been supposed that the gas supply under this system depends absolutely on the perfect working of the electrical arrangements; and, on this ground, some fear may have arisen as to the result of employing electricity in connection with the system. The objection, however, has no real foundation. The stoppage of the electrical current would not interfere with the governor load; and, in any case, such an event would leave the governor as free as any other governor to be operated by hand in the usual way. And, with reference to the idea that the interruption of the electrical current might be a thing of frequent occurrence, it should be borne in mind that the whole system of railway signalling is dependent upon electrical agency; and this consideration might surely inspire confidence in the use of electricity in such a case as the system now under discussion, where there is really no risk at all from the employment of the same agent.

One other question may possibly have arisen, though not quite in the nature of an objection—viz., if the pressure is controlled from the lowest part of a district, will it not be necessary to change that given pressure to suit the various consumptions? If the system accomplishes what it proposes, this will not be necessary, and in practice it has been found to be altogether unnecessary. If it were necessary, however, the pressure could be changed very readily as often as might be desired. It requires only a moment's consideration, however, to see that if the minimum pressure of 12-10ths, or any other minimum pressure that may be thought desirable, is maintained in that part of the district which is the worst supplied, every other part of the district must, at all times, be receiving its gas at an ample, but never at an excessive, pressure.

* An illustration of the plant required to work the system appeared in our report of the paper by Mr. Chester already alluded to.

APPENDIX.

A Short Description of the Apparatus Employed in the "Cowan Pressure System."

[For illustration, see "JOURNAL," Vol. LXX., p. 28.]

The apparatus consists of—

(1) A governor arranged for water loading.
(2) A pressure vessel or small gasholder connected to the main in the lowest pressure part of the district.
(3) A board placed in the governor house on which are fixed two electrically controlled water-valves for loading and unloading the governor.
(4) A small water cistern fitted with ball-cock for supplying water-load to the governor.
(5) Connecting wires between the pressure vessel and the electrical apparatus, for operating the water-valves.
(6) The battery for supplying the electric current, composed of ordinary Leclanché cells or accumulators.

The working of the apparatus is as follows: Immediately the pressure is reduced in the district by an increased consumption, the bell of the pressure vessel falls, and, in so doing, makes an electric contact by means of an arm fixed to the bell coming in contact with another arm attached to the tank. This contact completes an electric circuit between the pressure vessel and the water-supply valve, which then opens and supplies water for loading the governor, until the pressure in the district is brought again to the standard pressure. Immediately this pressure is attained the bell rises, breaks the electric circuit, and allows the water-supply valve to close. As the pressure in the district increases by the consumption decreasing, the bell of the pressure vessel rises; and in rising it closes another electric circuit by means of another set of arms. This opens the syphon valve, and allows water to run off until the pressure is again restored to the standard fixed.

Discussion.

The PRESIDENT said they were all very much indebted to Mr. Hepworth for the time and care taken by him in bringing the subject before them. The paper was a very instructive one. He had now come to a stage where he could not do without a governor; and it came to be a question which was best. He had a feeling much the same as that expressed in the last paragraph—namely, was electricity the best agent for changing; but

Mr. Hepworth got over that by saying that if electricity was used for signalling on railways, they might adopt it too.

Mr. W. FOULIS (Glasgow) did not think there could be any doubt that there was a great deal of ingenuity displayed in the invention. Of course, he had had no experience whatever of it in practice; neither had he given any attention to its working. But he doubted very much if it would be an instrument that would be suitable in all cases. He did not know whether Mr. Hepworth's suggestion was that there should be a number of these pressure vessels, scattered through the town, at different places where the pressures were likely to be low. This would mean, of course, that each of the districts would require a separate main, and a separate governor at the works, to be controlled by the system. There could be no doubt that the point at which the pressure should be maintained was the lowest part of the town—that was to say, they should maintain the pressure sufficiently there, and then, of course, they would be sure that their pressure would be sufficient in all the other districts. In Glasgow they had succeeded fairly well, by having telephonic communication with different offices in various parts of the town; and the pressures were telephoned from there to the works where the station governors were. The instrument before them did automatically what they in Glasgow did by means of telephone messages.

Mr. J. M'GILCHRIST (Dumbarton) said that, with regard to the pressure-changer, he should like to hear how it would operate in a town where the gas-works were at the lowest point of the district. He saw quite well the force of having the pressure-changer if the governor, or the gas-works, were situated at a higher elevation than the lowest part of the town. In his own case he did not see how it would be of any service, because the gas supply was from the lowest part of the town.

Mr. A. WADDELL (Broughty Ferry) said he should like to thank Mr. Hepworth for having brought this matter before them. They all knew of the need they had to have their pressure kept as uniform as possible at all times; and they were all aware of the trouble they had through people in one part of the town saying they had very bad gas, while those in another part declared that it was very good—the gas being the same all the time, and the only difference being (although the people did not know it) in the pressure. In his own case, a complaint recently came from a certain part of the town. He went to the place and took the pressure during the day. It was in an elevated position, and the pipe running through the district was a small one. He found something like 22-10ths pressure during the day time. He went back and took the pressure at night, when the heavy consumption was on, and then he got 12-10ths. Since that time he had relaid the main, and the complaints in the district had ceased. This showed that it was not, as they all knew, uniformity of quality alone that was needed, but uniformity of pressure also was wanted.

Mr. M'GILCHRIST: Perhaps Mr. Hepworth, in considering this matter, will take into account the fact that we go on the principle of having a large main and a low pressure.

Mr. A. BELL, sen. (Dalkeith), said he was sure the members had been very much indebted to Mr. Hepworth for reading the paper. It had been complained that some of the papers read that day had gone over the heads of most of the managers in Scotland. It was well that they should be so; for such papers acted as a sort of ferment, as it were, in the minds of managers. This was very much the case both with Mr. Little's conveyors and Mr. Hepworth's pressure-changer. In all large and well-appointed works, they had district mains, with a governor controlling each; whereas in small works they had just one great supply main for the whole. The instrument before them, therefore, would not be of very much benefit, unless there were great variations in the elevation.

The PRESIDENT said he supposed that, from the description given by Mr. Hepworth, the principal saving or advantage in the pressure-changer was the doing away with the attention of some individual, located in different situations, such as in Glasgow, keeping up telephonic communication. He supposed this was the principal advantage. There were instances where the levels might vary in a town—say, from sea-level to about 250 feet. In his own case there was a variation of 150 feet. He did not know how the pressure-changer would act in such a case. They were supplying a level 150 feet below the gas-works, which would be 1½ inches of pressure; so that they would have an extraordinary pressure at some of the higher places. He fancied that a district governor in his case would get rid of any difficulty.

Mr. HEPWORTH expressed his obligation to the members for the patience with which they had listened to his paper; and, in reply to the questions which had been put during the discussion, he thought he might say that it would appear that the object of the instrument had been, at all events, understood perfectly well by those who had followed him. As Mr. Foulis had said, it would be necessary to take into account the low districts. He supposed that if they had a large town, supplied by three, six, or thirty governors—as many as they pleased—they would probably have each governor supplying its own district. One governor would not work in with the next. If they had a town districted in this way, it would only be necessary to have one of the pressure vessels in every district, at the lowest part—he meant the worst supplied part—and it would be sufficient to cover all the wants of the other parts of the district. They were aware that in large towns the inconveniences of sudden local demands had been met by the use of the telephone or the telegraph; but, of course, it was for everyone to judge for himself. Provided the person at the telephone office in the district knew of the want which had arisen, he could go and make his wants known, and they would be at once attended to. But he (Mr. Hepworth) had a case in his mind—and there might probably be a great many others—where for certain industrial purposes gas was used very largely intermittently, and at times which could never be arranged beforehand, no one outside the place knowing that the demand had arisen. Every time this demand arose, the instrument would immediately indicate to the governor at the gas-works that it had arisen; and until the demand was met and supplied it would go on asking for gas to be sent. This, he thought, was perhaps the best way in which the advantages of such a system could be seen to be even greater than those of the telephone or telegraph.

Mr. FOULIS: Would you have the instrument placed outside the works in that case?

Mr. HEPWORTH: Yes.

Mr. FOULIS: It would be rather awkward, would it not?

Mr. HEPWORTH said presumably that would be the worst part of the district. Mr. M'Gilchrist had spoken of his works being in the lowest part of the town. He believed this was the case with most gas-works; but no one who had his works at the lowest level of the town—at least he should think there were few, if any—would say that the pressure he had at that level was one he would be always able to give, or wanted to give, at some other low level in the district he supplied. But, in any case, if there were a deficiency in any part of a district or town which had its gas-works at the lowest level, the deficiency would, by this instrument, be immediately made known at the works, and be promptly supplied. Whether or not there was a man to supply it, the pressure would be put on. It was, as Mr. M'Gilchrist had said, desirable that they should provide large mains rather than have high pressures; and, of course, most engineers managed to do this as soon as they were able. But, as he said in his paper, the mains somehow were always becoming insufficient to convey the gas that was wanted. The consumption went on increasing; so that a main which might be perfect that day would be sure to be a little imperfect that day week, and more so that time next year. Whatever comparison or difference there might be between the wants of a district and the supply arrangements, those wants would be met by the instrument he had described. The President had said that probably its value might consist in dispensing with the attention of a few persons employed in looking after the governors. This might be the result; and it certainly would be, so far as any necessity or demand for gas arose, because no man need look after the governors if he had the pressure system. But he did not think the value of an instrument like this could be computed in that way. The value of it, he thought, was that, while it might do away with the attention of the man in charge of the governor-house, who might not come in just at the right time, it did more, for it enabled the manager to feel quite sure that, whatever might or might not fail him at that or any other point, an extra quantity of gas would be supplied, if needed, at any given place. The instrument brought the intelligence home to the works; and the required supply of gas was afforded.

New Joint-Stock Companies.—The Clydesdale Tube Company has been registered with a capital of £150,000, divided into 5000 preference (5 per cent.) and 10,000 ordinary shares of £10 each, to undertake the manufacture of steel and iron, tubes of wrought iron, steel, and other metal, and to carry on the business of ironmasters, engineers, boiler makers, &c. The Compound Hydrocarbon Motor Syndicate, Limited, has been registered, with a capital of £12,000, in £1 shares, to enter into an agreement for the acquisition of a business carried on at Luton, Bedfordshire, and to manufacture, sell and deal in oil, gas, steam, and electric motor cars.

A Local Government Board Inspector's Recommendation.—A recommendation and remark made by Major-General Carey during an interview that a deputation from the Shrewsbury Town Council had with him in his capacity of an Inspector of the Local Government Board will no doubt be regarded by consulting water engineers as unfair to them as a body. The interview took place on July 22; and the object of the deputation was to point out to the Board the difficulty in which the Council have been placed in consequence of the opinions of several water engineers whom they had consulted being ignored by the Board. After a full discussion, Major-General Carey recommended that the Council should obtain a report on the whole question of water supply from some eminent engineer, who should be allowed an entirely free hand as to the source of the supply, with the restriction that it must be able to provide 30 gallons per day for each inhabitant of the borough; but the Board objected to a supply from the Severn, even if the water were filtered, if water could be obtained elsewhere at a cost which the town could afford. General Carey suggested that a report should be drawn up by the Engineers who have been employed by the Corporation (Messrs. Taylor, Sons, and Santo Crimp), or the Council, if they wished to employ an Engineer totally unconnected with Shrewsbury and its water supply, might consult Mr. George Hodson, "whose opinion would carry great weight with the Local Government Board." The recommendation, in such terms, of an individual Engineer by a gentleman in the position of Major-General Carey is much to be regretted; seeing that its publication in several provincial papers has resulted in an "advertisement" which will probably prove advantageous on future occasions to the Engineer named, to the detriment of others.

REGISTER OF PATENTS.

Manufacture of Illuminating Gas.—Lewes, Vivian B., of Greenwich. No. 17,749; July 28, 1897.

This invention relates to the production of a mixture of carbon monoxide, hydrogen, and methane, and enriching the mixture on its way from the purifying apparatus with acetylene; the arrangement of plant shown in the specification being the same as that illustrated in the "JOURNAL" for June 28, p. 1539, in connection with the closing sentence of Professor Lewes's lecture before The Gas Institute the previous Wednesday in Belfast.

The patentee points out that, as is well known, if acetylene in quantities below 10 per cent. be mixed with hydrogen, carbon monoxide, or water gas, the mixture burns with a practically non-luminous flame; and he has made a long series of experiments in order to ascertain the cause of this phenomenon and the means by which it may be overcome. He finds that, if acetylene be mixed with methane (which is a compound of 12 parts by weight of carbon with 4 parts by weight of hydrogen), even the smallest proportion of acetylene endows the mixture with considerable illuminating value; and if 30 per cent. of methane be mixed with hydrogen, carbon monoxide, or water gas, though the mixture will have no illuminating value, yet, on the addition of acetylene in any proportion, the mixture will develop light.

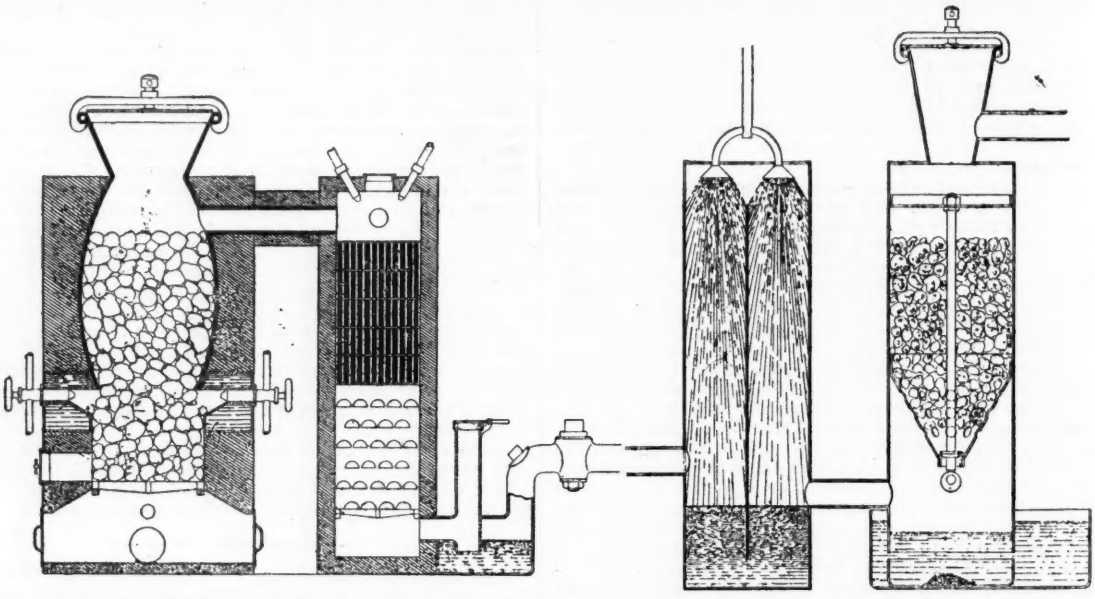
The generator shown is formed of a gas-tight casing lined with fire-brick, and fitted with fire-bars at the bottom above an ash-pit. It is charged with coke, anthracite, or other carbonaceous fuel, which can be ignited and then raised to incandescence by air-blasts injected into it through openings arranged at various heights in the column of the fuel. In this way, the fuel is quickly raised to incandescence by causing the combustion, in the upper portion of the fuel, of the carbon monoxide formed at or near the bottom of the mass of fuel, by air admitted to the ash-pit through an opening below the fire-bars.

About half way up the mass of fuel, the generator is provided with a water-cooled ring fitted (say) at three places around its circumference, with injectors by which tar or other liquid or semi-liquid hydrocarbons can be injected by steam into the mass of incandescent fuel, and also at three or other suitable number of points around its circumference with air-inlet openings through which blasts of air can be injected into the fuel. The form of water-ring shown contracts the interior of the casing at one point, below which it is formed with a circumferential groove or recess of wedge section. This arrangement is such that, as the fuel descends past the contracted inner portion of the generator, it leaves below the upper ledge of the water-cooled ring and the internally grooved portion of the ring, a space into which the air-blast pipes and the steam-injectors for the tar or other hydrocarbons deliver. Below the fire-bars are one or more additional steam-inlets.

At a point above the surface of the fuel, the generator is connected by a branch pipe with a superheater comprising a vertical chamber, the upper portion of which is filled with fire-brick arranged chequerwise; while the lower portion contains ingots of iron. At the bottom of the superheater is an outlet passage, connected with a vertical pipe, the upper end of which is provided with a snift valve, and the lower end of which dips into water contained in a closed receptacle, from the upper part of which extends an outlet-pipe provided with a cock. The outlet-pipe is connected to a gas-scrubber, which, in the example shown, comprises a vertical chamber divided by a vertical partition into two connected vertical passages provided at the top with sprinklers. Two or more distinct, but connected, chambers or towers may, however, be used. To the outlet of the scrubber is joined an acetylene generator.

That shown comprises a vertical chamber charged with calcic carbide, supported by a lower perforated cone, closed at the bottom by a valve. The valve is attached to a guide-rod, and has a jigging motion imparted to it by a cam, or its equivalent, on which the valve bears, and which is driven from the exterior of the apparatus at a rate depending upon the amount of acetylene required to be mixed with the diluting gas.

In practice, the apparatus is used as follows: Fuel having been placed in the generator and ignited, it is blown up to a state of incandescence by blasts of air admitted through the several air-inlet openings; and the products of combustion, while at a high temperature, are led down



through the superheater, and allowed to escape by the snift valve—the cock in the outlet-pipe from the water-seal being at this time kept closed. When the mass of fuel has been raised to a bright red heat, the air-blast through the upper air-inlet openings (which may be about midway between the top of the water-cooled ring and the top of the mass of fuel) is cut off; and a small quantity of air is admitted into the upper part of the superheater. This causes the combustion of any carbon monoxide in the gas which is being generated, and completes the heating of the superheating chamber to a dull red. The fuel being now incandescent and the superheater hot, the snift valve is closed, the cock in the outlet-pipe opened, and all the air-blasts cut off. Tar is then sent through the injectors, by means of steam, into the centre of the incandescent fuel; the steam being converted into water gas, and the tar being simultaneously decomposed by the heat into a mixture of hydrogen and methane in its passage through the incandescent fuel. The carbon which is added to the fuel in the generator is at the same time deposited. While this decomposition is taking place, steam is admitted in small quantities into the ash-pit and the lower part of the fuel, through openings below the fire-bars. This steam, in passing through the lower portion of the mass of incandescent fuel, forms water gas, which rises up through the fuel, and prevents the tar remaining in the fuel and becoming over-decomposed.

A certain quantity of sooty and tarry matter will pass forward with the gas into the superheater; and to prevent it choking up the interstices between the fire-bricks therein, there is introduced in a downward direction into the top of the superheater, through nozzles, a regulated supply of steam, which also forms water gas with any carbonaceous matter that may be present, and thus prevents stoppage of the superheater. The mixed gases—consisting of hydrogen, carbon monoxide, and methane—produced in this manner pass on through the water-seal and outlet-pipe to the scrubber or other purifying apparatus employed.

The generation of gas in this manner is continued until the temperature of the fuel in the generator has fallen below the required point, whereupon the supply of hydrocarbon is shut off and a supply of air turned on, so as to again raise the fuel to incandescence; any hydrocarbon remaining in the generator assisting the carbon monoxide generated by the action of the air on the fuel to reduce to the metallic state any oxide of iron that may have been formed on the iron in the superheater, by the action of the steam previously admitted. In this way, the iron will be ready for re-use when again generating a mixture of carbon monoxide, hydrogen, and methane.

A very large volume of gas suitable for enrichment by acetylene or other hydrocarbons of high illuminating power can be thus produced; and its purification and enrichment by acetylene is carried out as follows: On leaving the outlet-pipe, the gas is led through the washer or scrubber in which, during its passage up and down the vertical channels therein, it is washed by sprays of lime water or lime water and lime sludge delivered from sprinklers at the top. In this way, the gas is to a great extent purified from any carbon dioxide and sulphuretted hydrogen which it may contain, and is also fully saturated with water vapour. The moist gas is led direct into the lower part of the acetylene generator, and ascends through the carbide, so that the water vapour which it contains slowly decomposes the carbide. The acetylene evolved becomes mixed with the gas, which is at the same time thoroughly dried and passes off from the top of the generator.

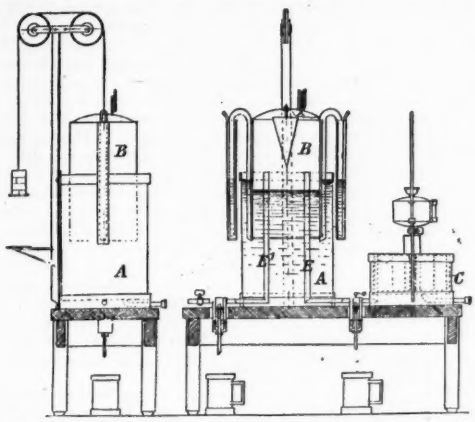
The amount of acetylene so mingling with the gas would, however, as a rule, be too small in quantity to enrich it to the desired extent. For this reason, the carbide is caused, by the rising and falling of the valve at the bottom of the cone, to pass downward, and be slowly discharged into water arranged to close the generator and act as a seal. As the carbide falls into this water, it is decomposed, with liberation of acetylene and formation of lime; the acetylene mixing with, and passing upward with, the other gas formed, and the lime, to a certain extent, dissolving in the water which is kept flowing through the seal.

This water, or a portion of it, mixed with lime sludge, may advantageously be used for purifying the gas coming from the main-gas generator. For this purpose, it is pumped up and supplied to the sprinklers for purifying the gas in the washer or scrubber. This utilization of the lime water and sludge produced in the manufacture of the acetylene for the purification of the gas which has to be afterwards enriched, is claimed as a feature of considerable practical importance.

The degree of enrichment of the gas with acetylene is regulated by the rate at which the cam and valve are driven. The patentee has obtained satisfactory results when about 10 per cent. of acetylene is mixed with a gaseous mixture consisting of about 52 per cent. of hydrogen, 16 per cent. of carbon monoxide, and 32 per cent. of methane.

Acetylene Gas Generators.—Reggiani, N., and Chrisini, A., of Rome. No. 17,482; July 24, 1897.

The apparatus shown consists of a reservoir A, a moveable bell-shaped top B, and two or more generators C, according to the size of the apparatus. In the reservoir filled with water are two pipes—E, leading from the generators into the bell; the other E^1 forming the outlet-pipe from the bell. To the bell-shaped top is attached a counterweight, by means of a chain passing over two pulleys pivoted to the standard, so that the bell is kept in equilibrium by the pressure of the gas and by the counterweight. Two syphons are attached to the bell, serving to regulate the water-level and the weights of the bell, and to maintain constant the pressure of the gas till the cone in the interior of the bell comes into operation, and, by entering into the water, raises the bell a little. This produces a certain diminution in the pressure of the gas. The syphon-tubes fixed to the bell of the gasholder (and each connected to its own



tube) serve the purpose of keeping constant the water-level in the holder, as well as balancing the weight of the bell. The syphons and the cone can, however, be substituted by two spiral springs attached to the axis of one of the pulleys, and serving to control the action of the weights fixed to the extremities of the springs.

The novel features claimed for the apparatus are: (1) The arrangement by which the water enters directly and automatically into the generators through the action of a cone or other floating body, or by means of a spiral spring fitted to the axis of the pulley of the bell, producing a small diminution in the pressure of the gas. (2) The arrangement shown by which the water, passing from one compartment to the other, and penetrating in each compartment, consumes all the carbide of calcium from the bottom upwards by means of the perforated diaphragms before entering the next compartment. (3) The closure of the generators by means of lids, so as to render the apparatus inodourless; and the arrangement by which the generators can be re-charged at a certain distance from the apparatus. (4) The eduction-pipes for the condensation waters serving as safety-valves in the case of excessive production of gas.

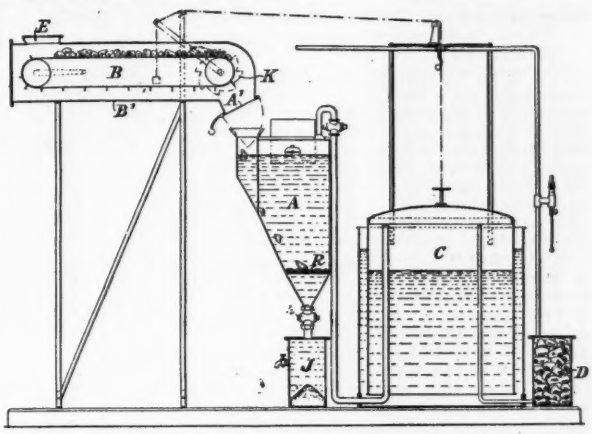
Manufacture of Gas and Obtaining Bye-Products therefrom.—Gobbe, E., of Jumet, Belgium. No. 17,976; July 31, 1897.

This is plant intended more especially for use in glass factories; and it is designed so that the bye-products contained in the fuel gases can be collected by separating the rich gas which contains these bye-products from the poor gas which passes to the place of storage or utilization. Gas-generators as heretofore constructed, says the patentee, necessitate the washing of the whole volume of the gases generated; and as these gases leave the furnace at a very high temperature, there is a very considerable loss of heat, and very extensive washing apparatus is needed. Such generators also yield little sulphate of ammonia per ton of coal, and are not economical because a great quantity of heat is wasted. His proposal, therefore, is to obviate these inconveniences by permitting the separation of the rich gas from the poor gas, so that only the former is subjected to washing. He also proposes the injection of steam into the zone where the nitrogen of the carbon is disengaged from its combinations, and can readily enter into chemical union with the nascent hydrogen of the steam, in order to form ammonia.

Manufacture of Acetylene.—Munsterberg, O., of Berlin. No. 19,615; Aug. 25, 1897.

In this apparatus for the manufacture of acetylene, means (carried by the gasholder) are adapted to operate a counterweighted valve on a water-pipe leading to the carbide holder, and, after the holder is exhausted, to operate the counterweighted valve of a water-pipe leading to a second carbide holder—the second valve being provided with means for striking or resetting the first. There is also a device for use in connection with the carbide holder, in which, upon the opening of the holder, the passage for the gas between the latter and the holder is blocked, and on the closing of the carbide holder the passage is opened—the movement acting also to open and close an escape-pipe if desired. A moveable band or intermittently operated measuring and feeding device carries the carbide, controlled by the movement of the holder. Other features of novelty are: The means for feeding the carbide to the water, and the employment in the generating chamber of a partition separating the part of the chamber into which the carbide is directly fed from the part in which the main body of the gas is generated.

The apparatus shown consists of the generator, A; the feed mechanism, B; the gasholder, C; and the purifying or drying chamber, D. The feeding is effected by means of an endless band adapted to pass around two rollers within a casing B^1. The outer surface of the band is provided with transverse ledges, the intermediate spaces between which are arranged to hold a given quantity of carbide. The casing B^1 has a feed-hopper E, which can be closed up practically air-tight by a lid, and through which the carbide is passed on to the endless band. An intermittent periodical forward movement of the band is effected either by a separate motor, through clockwork or the like, or by transmission-gearing from the bell of the gasholder. In the drawing, a pawl is used in connection with a lever-arm, which is pulled by a cord or chain attached to the bell of the holder as soon as it has descended to a certain point. A weight attached to the cord brings the lever and the pawl back, as soon



as the bell ascends. The pawl is thrown into gear with a ratchet-wheel K, on the axis of one of the rollers. The contents of each compartment of the belt are successively discharged into the outlet A^1 of the casing B^1 as the ratchet-wheel K is rotated; this outlet being closed by a flap provided with a counterweight. The flap is forced open by the weight of the descending carbide, which falls into the mouth of the generator, which is (as shown) nearly filled with water. The space in the generator above the water-level, and in which the gas is collected, is separated from the mouth by a diaphragm having an opening in it. Through this the carbide falls upon a grate R; the gas generated rising and escaping into the gasholder, from whence it is conveyed through the purifying or drying apparatus D to a pipe, from which it may be taken off to the burners.

When the bell rises to the highest point, it may, if desired, be caused to move a valve so as to open it, and allow the excess of gas to escape at the open end of the pipe, either to waste or to a second gasholder, so that a safeguard is provided against damage from over-pressure.

The lime mud formed as the carbide is decomposed passes through the grid R, and is discharged either through a large valve or else collected in a receptacle J.

Producing Gas from Sewage Sludge.—Dancer, W., of Manchester. No. 20,184; Sept. 2, 1897.

In carrying this invention into effect, the patentee first dries or partially dries sludge or sewage precipitate, by means of the heat evolved from refuse destructors or other source of waste heat. It is then put into an ordinary gas-retort, and subjected to distillation at a high temperature. By this means, there is a direct conversion of it into gas and ammonia, together with a small proportion of undecomposed oil. To effect the most complete decomposition, two retorts are preferably used—the second retort containing red-hot coke or other inert substance, so that any oil which may distil over from the first retort is converted into gas on coming into contact with the heated substance in the second retort. The gas produced is mainly oil gas, and may be purified in the usual way. The ammonia carried over with it is separated by washing, as in the case of coal gas. The residue in the retort where lime has been used as a precipitant is of value as a manure, on account of the lime and phosphate of lime which it contains. Where salts other than lime—such as sulphate of iron—are used to effect the precipitation of the sludge, the residue in the retort may also be used for the purification of coal gas, or for other purposes.

Another method of treating the sewage sludge is to distil it at a lower temperature in large retorts similar to those used in Scotland in the manufacture of shale oil. This method would be most suitable, says the patentee, where large quantities of sewage sludge have to be disposed of, and where the gas cannot be used for illuminating purposes—as, for instance, in places where the producers of sludge are not also gas manufacturers. In this method, oil is distilled off at a low temperature, which oil could afterwards be made into gas in the ordinary method of oil-gas manufacture; and any gas given off by this process of distilling oil at a low temperature could, after the recovery of the ammonia, be used in place of fuel for heating retorts, as is at present done in shale-oil works.

Incandescence Illuminating Bodies.—Boult, A. J.; a communication from the Chemische Fabrik von Max Jasper, of Bernau, near Berlin. No. 30,145; Dec. 20, 1897.

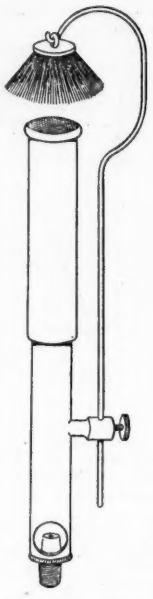
This invention has for its object to render existing incandescence bodies for illuminating purposes sufficiently durable to withstand any vibrations to which the burner may be exposed. The body is impregnated with a solution containing an alcoholic and an ether organic compound of silicon, which when burnt forms silicon dioxide on the body. The body to be treated may, says the patentee, have been specially manufactured for the purpose, or may be an existing body—such, for example, as a woven mantle, which may be treated either in its new or unburnt condition, or after it has been burnt, when it consists solely of the incandescing ash.

The process consists in immersing the body into the silicon solution, which may be made up, for example, of 15 per cent. of silicic-amyl-ether

with 85 per cent. of amyl-alcohol. On removal from the solution, the body is ignited while still wet, and maintained at a red heat. The silicic acid thus liberated by the burning of the organic silicon compound adheres to the incandescence body, combining when subjected to heat with the constituent parts of the body. A single dipping is usually sufficient.

Any organic silicon compounds which are combustible and when burnt form silicon dioxide, may be employed for the impregnating solution; but compounds with esters and alkyls are said to be preferable. Alkyls of silicon are, however, less suitable than silicic-esters produced by the action of silico-chloroform ($Si H Cl_3$) on alcohols, or by the treatment of methyl, ethyl, amyl, or other similar alcohols with silicon chloride ($Si Cl_4$).

Incandescent Lamp Device.—Hooker, L., of Sydney, New South Wales. No. 28,060; Nov. 29, 1897.



This device for use with incandescent gas-lamps consists of a tassel hung on the hooked end of a wire upright to the bracket or burner. The tassel consists of a disc of asbestos covered with linen, calico, or other material, or of wire gauze, platinum, or perforated steatite. Into the disc is fastened one end of a bunch of hemp or asbestos threads—the whole arrangement being narrower at the top than at the bottom. When made the tassel is immersed in a solution consisting of acetate of aluminium, acetate of magnesia, chrome alum, and acetate of zirconium. The best proportions are said to be 1 oz. of aluminium, 1 dram of chrome alum. 1 dram of acetate of magnesia, and 2 drams of acetate of zirconium—the aluminium being saturated with acetic acid with 2 ozs. of water added, and the whole dissolved in an evaporating dish by the application of heat. It is afterwards subjected to the gas-flame and the foundation material destroyed; the tassel remaining a "hard non-inflammable substance." The fact of its swinging freely on a hook above the flame will, says the patentee, ensure its "accommodating itself to the draught from the flame, and always occupying a proper relative position thereto."

Illuminating and Heating Gas.—Tooth, E., of Redfern, New South Wales. No. 8555; April 12, 1898.

This proposal is to form a gas by simultaneously bringing into contact with water carbide of calcium, unslaked lime, and terebine (or a solution of resin in molten naphthalene with or without the addition of paraffin). The three ingredients are contained in cartridges in the proportion by bulk of about 40 per cent. of carbide of calcium, 50 per cent. of lime, and from 5 to 10 per cent. of terebine. They are immersed in water, or water is brought into contact with them in sufficient quantity to cause the necessary reaction, in any form of acetylene generator in which the bringing into contact of the solids and liquids is properly regulated.

The unslaked lime should, says the patentee, be as far as possible free from impurities, and especially free from magnesia. The carbide of calcium is preferably the vehicle for holding the terebine; the cartridges, blocks, or lumps, of the carbide being for this purpose dipped in a bath of terebine until they are partially saturated and thoroughly coated with a good layer of it. The terebine or resin dissolved in molten naphthalene is, when in use, slightly heated. It is also said to be advantageous to mix with the terebine another rich hydrocarbon having a low melting-point—such as paraffin—to the extent of about 2 per cent. by bulk.

APPLICATIONS FOR LETTERS PATENT.

16,675.—Fletcher, T., Neil, J., and Fletcher, Russell, & Co., Ltd., "Condensing gas-stoves." Aug. 2.

16,687.—Crossley, W. J., and Atkinson, J., "Valve gear for internal combustion motors." Aug. 2.

16,712.—Wise, W. L., "Generating and burning gas from hydrocarbon oils." A communication from J. H. Moss. Aug. 2.

16,723.—Hedgeland, F. W., "Acetylene lamps." Aug. 2.

16,733.—Evans, E., "Generating acetylene gas." Aug. 2.

16,766.—Orme, F. H., and Howarth, W. C., "Prepayment mechanism for gas-meters." Aug. 3.

16,770.—Furnival, W., "Automatic lighting of gas-lamps." Aug. 3.

16,773.—Hughes, D., "Cock for gas or other fluid." Aug. 3.

16,785.—Strong, H. O., "Gas-stoves." Aug. 3.

16,858.—Reid, D., "Bunsen burners." Aug. 4.

16,868.—Willis, W. G., "Scrubbing and filtering gas." Aug. 4.

16,884.—Vabon, J., "Production of acetylene gas." Aug. 4.

16,885.—Thompson, W. P., "Gas-engines." A communication from J. Waldthausen, Bluhm, & Co., and J. Bauer. Aug. 4.

16,894.—Vautrin, C., and Brocard, A., "Producing acetylene." Aug. 4.

16,903.—Montais, M. L. J. R. de, "Acetylene gas-generators." Aug. 4.

16,978.—Carr, I., "Manufacture of sulphate of ammonia." Aug. 6.

16,993.—Parvin, J. G., "Gas or fluid regulators." A communication from M. Delmard. Aug. 6.

17,007.—Duke, J. F., "Incandescent gas lighting." Aug. 6.

17,008.—Read Holliday and Sons, Ld., and Read Holliday, "Generating acetylene gas." Aug. 6.

Skipton District Council and the Gas-Works.—The Skipton District Council have been in negotiation for some time past with the Gas Company with the view of purchasing their undertaking. At a private meeting of shareholders a few days since, the offer of the Council to buy was refused. At the same meeting, it was decided to call up the capital and exercise the borrowing powers under the Company's Act of 1863.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Profit-Sharing.

Sir,—The answer to the letter in the "Journal" of the 9th inst. is in the letter itself. Mr. Little admits the success following the adoption of his limited scheme of profit-sharing. Allowing for all the credit due to the increased attention the officials give since their participation in the profits of the firm, it certainly suggests to us that the workmen must have some of the credit. If so, we think they have established their right to have a share of that which now goes to the few. We also think the workmen are quite capable of being influenced for the better, as the officers and foremen have been. If workmen have been remiss in their duty, it suggests to us that the officers and foremen are not altogether free, by showing they can be effective if they choose, when inducements are offered them. Do not the workers possess the same elements? Then why not join them in the same great principle of profit-sharing. "Laugh and grow fat" is not in it if you seriously consider the facts.

The profit-sharing scheme of the South Metropolitan Gas Company is an additional answer to Mr. Little's letter. Take their prosperous condition and look back prior to 1889, when the Company only did as Mr. Little's firm are now doing—practised limited profit-sharing. We, the delegates of the "Workmen's Committee," do sincerely ask Mr. Little to do and say as Mr. Livesey did, that he saw no reason why the workmen should not share the same as officers and foremen. The difficulties will soon vanish. Then we shall have a trio joining in the chorus profit-sharing, as a remedy to eliminate the lazy and incapable. Mr. Little should adopt the system as it exists in the South Metropolitan Gas Company—that is, each workman who is to share in the profits must sign an agreement to act as an intelligent workman should do. Failing to do so, then he is not allowed to sign again, until he mends his way. These agreements are yearly. By this means Mr. Little would have an effective remedy against the lazy and incapable sharing in the profits.

We sincerely hope that if Mr. Little can see his way to adopt the scheme among his workmen, the same happy results will follow, as the published accounts of Messrs. Richmond and Co. show, in their case, and as we experience in the case of the South Metropolitan Gas Company. Here a spirit of peace and goodwill prevails, accompanied with that excellent quality thrift, which has enabled the employees to save upwards of £100,000. This is, we hope, another answer to the letter why Mr. Little should extend his scheme to his workmen.

We, with Mr. Little, sincerely hope that his letter will open up a good discussion on the value of profit-sharing among workmen and employers of this country. We, however, find it difficult to express all we feel on this subject; but should Mr. Little ever come this way, we are sure we could, in conversation, better explain to him the value of profit-sharing than in writing.

Signed, on behalf of the Profit-Sharing
Committee (Workmen's Representatives),
H. T. Manley.

70, *Ruby Street, Old Kent Road, S.E.*,
Aug. 12, 1898.

Dr. Auer's Incandescent Electric Lamp.—The Austrian Incandescent Gas-Light Company of Vienna have acquired the rights in Dr. Auer's new electric incandescent lamp for Eastern Europe. For this purpose the capital has been increased to 3,500,000 gulden, and the title of the Company has been changed to the Austrian Incandescent Gas-Light and Electrical Company.

Lamp-Posts as Fire-Alarm Indicators.—If a suggestion of the London County Council is acted upon, the streets will be brightened up through certain lamp-posts being painted a bright red colour, so as to indicate that a fire alarm is close at hand. The Council's original intention was to have hands affixed to certain lamp-posts, pointing to the alarms; but as only a few of the Local Authorities of London adopted the idea, the bright red lamp-post is now suggested as an alternative.

The Lighting of Paris Theatres and Music Halls.—A Commission appointed by the Minister of Fine Arts in Paris to draft new regulations for theatres and music halls has, it is reported, laid down the rule that in future the only illuminants permitted in these places will be the electric light and vegetable-oil lamps. The Commission evidently had some misgivings as to the security of electric lighting, for they specify that an expert electrician is to be in attendance while the halls are in use.

The Prepayment and Stove-Hire Systems at Carlsruhe.—The automatic prepayment system of gas supply has been introduced by the Municipality of Carlsruhe. By the deposit of 15 groschen (1½d.), a cubic metre (35·3 cubic feet) of gas may be purchased. The Municipality also let fittings and stoves on hire at 1 mark (1s.) per quarter, for which sum burners with incandescent mantles are provided. It is estimated that under the new arrangement a workman will be able to light his dwelling for 0·1d. an hour, and his wife do her cooking for twice this sum.

The Public Lighting of Beccles.—A special meeting of the Beccles Town Council, was recently held to receive the report of the Public Lighting Committee recommending an agreement with the Gas Company for the public lighting for the ensuing year, and also the employment of Mr. Medhurst at a cost of £21 to report on the electric lighting of the borough. Alderman Masters, the Chairman of the Sanitary Committee, moved the adoption of the report, and pointed out that during the last fifteen or twenty years the cost of lighting the borough had increased from £180 to £600. Last year more complaints than ever were made; and the Committee thought it desirable that an expert's opinion should be obtained on the electric lighting of the borough. The Deputy-Mayor (Mr. Pells) seconded the motion, and said they tried incandescent lighting two years ago, but were obliged to go back to the old system. By getting expert advice they would put themselves in a position to settle the question as to what was best for the town. Alderman Walton argued that it was an unnecessary waste, and that it would be much better to spend the money in incandescent lamps than to run into some "wild cat" scheme of electricity. After some discussion, the recommendation of the Committee was adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

THE END OF THE SESSION OF 1898.

The following Bills received the Royal Assent last Friday, when the session closed: Carlisle Corporation Water Bill, Filey Water and Gas Bill, Forres Water Bill, Heywood Corporation Water Bill, Keighley Corporation Bill, Mid-Kent Water Bill, Newcastle and Gateshead Water Bill, Newhaven and Seaford Water Bill, Faignton Improvement Bill, Rhymney and Aber Valleys Gas and Water Bill, Rochdale Corporation Water Bill, St. Helens Corporation Bill, Todmorden Corporation Water Bill, Wath-upon-Dearne Urban District Council Bill, Wey Valley Water Bill.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Tuesday, Aug. 9.

(*Before Justices* MATHEW *and* KENNEDY, *sitting as a Divisional Court.*)

Grand Junction Water-Works Company v. Hampton Dist ict Council.

This was a case stated by Justices on a summons against the Grand Junction Water-Works Company, on which they convicted the Company under the 3rd section of the Public Health (Buildings in Streets) Act, 1888. The previous proceedings were reported in the last volume of the "JOURNAL," pp. 1146, 1581.

Mr. BOSANQUET, Q.C., Mr. MACMORRAN, Q.C., and Mr. CUNNINGHAM GLEN appeared for the Company; Mr. H. H. ASQUITH, Q.C., and Mr. C. MUNROE represented the District Council.

Mr. BOSANQUET said section 3 of the Public Health Act of 1888 was substituted for an old section of the Act of 1875. After enacting that it should take the place of that section, it said it should not be lawful in any urban district, without the written consent of the Urban Sanitary Authority, to erect and build in any street beyond the front of the main wall. The Grand Junction Water Company, by their Act of 1852, had power to take compulsorily certain lands (among others, the land on which the buildings now in question had been commenced), and to execute certain works—first a reservoir or reservoirs in the parish of Hampton. They had acquired compulsorily a three-cornered piece of land between two roads; and they were authorized to build thereon the reservoir and other works. By the General Act the Company were authorized to make, maintain, alter, and continue engines and other works, and erect such buildings upon the land and premises as they should think proper for supplying the inhabitants of the town or district with water. Land having been given to the undertakers for a special purpose, it was taken out of the ordinary category of private owners' land; and the general enactment which said that one should not build in a street beyond the adjoining house did not apply to such land. Five years was the limit allowed to the Company for executing their works; but this was not to prevent them from making any extension. The limits of the Act had since been increased. In 1897, the Company desired to extend their works, and construct and erect upon the land an additional engine-house. They sent in plans, which the Council would not pass on the ground that the proposed building came in front of those on either side. Thereupon the Company commenced the works, and had expended £1500 upon them. The present building was in front of the two small buildings some way off; and the contention of the respondents was that the appellants would have to go back as far as the buildings behind the engine-house.

Mr. ASQUITH said the short question was whether the Company were authorized by their Special Act to have a statutory licence to override the general law of the land in the district. He submitted that the general power to extend, like all other general powers, was subject to the provisions of the 93rd section of the Water-Works Clauses Act of 1847, which was as wide as language could possibly make it: "Nothing herein contained shall be deemed to exempt the undertakers from any General Act relating to water-works, or any Act improving the sanitary condition of towns and populous districts which may be passed."

Wednesday, Aug. 10.

Justice MATHEW, in giving judgment, said the appeal was against a conviction made on a summons brought by the Hampton Urban District Council against the Water Company. The alleged offence was under the Public Health Act of 1888, which forbade the erection of any building or part of a building in a street beyond the front main wall of the buildings on either side. The conviction was perfectly proper, as the works constructed by the Company were erected beyond the main walls of the houses on either side.

Justice KENNEDY concurred.

Judgment was therefore given for the respondents, with costs.

A Question as to Hired Gas-Fittings.

At the South-Western Police Court, last Tuesday, before Mr. Francis, Mr. Thomas William Jones, a solicitor's clerk, of St. Martin's Lane, Charing Cross, appeared to answer a summons issued against him by the South Metropolitan Gas Company for fraudulently converting to his own use certain gas-fittings belonging to them, of which he was bailee. The Solicitor to the Company (Mr. Gossmore) stated that the defendant used to live at 19, Temperley Road, Balham, where he had certain gas-fittings on hire. In the agreement he made with the Company, he undertook to give notice of his intention to leave the district, and in such case to pay up the balance due, or to return the fittings. As a matter of fact, he did leave the district, and sold the house to a Mr. Llewellyn, including the fittings in the sale. He was asked by the Company to pay up all the instalments, but refused, saying he would keep the fittings and continue to pay the instalments. It was not till he had sold the fittings that the Company knew he had left the district. Mr. Francis said he had been quite misled in the matter. When he granted the summons, he was clearly led to believe that the fittings had been actually moved out of the house and sold to some one. It now seemed that they were still on the premises. The Company had their civil remedy against both parties. There was nothing criminal in the case. Mr. W. H. Stevenson, the defendant's Counsel, said it was monstrous that a respectable man like his client should be charged with felony on such a flimsy pretext. As a matter of fact, he had not even sold the fittings; the new tenant was to pay the instalments. Besides, it had been decided that gas-fittings were not goods or chattels. Mr. Francis dismissed the case.

Disputed Meter Registration.

At the Highgate Petty Sessions on Monday last week, before Lieut.-Col. Orton and other Magistrates, a claim was made by the North Middlesex Gas Company against Mr. J. H. Beardmore, of 24, Baronsmere Road, East Finchley, for £4 odd, for gas supplied to his residence. The amount sued for was in reference to 19,100 cubic feet of gas, at 4s. 3d. per 1000 feet, supplied in the March quarter of the present year. This corresponded with 11,600 cubic feet in the corresponding quarter of 1897, and 14,800 cubic feet in 1896. The meter was complained of; and, in consequence, it was tested and found to be 6·98 per cent. slow. There was also a further defect, inasmuch as only 60 feet were registered for each 62 feet burnt. There was a fire on the defendant's premises, and several weeks had not been reckoned. The defence was that too much gas had been charged for, and that the defendant's daughter was liable, and not himself. The Bench, however, made an order for payment of the amount, with 10s. 6d. costs.

Abstracting Money from Prepayment Meters.

At the Thames Police Court, on Monday last week, Frederick Jackson, 33, a labourer, was charged with stealing 12s. 8d., the property of the Commercial Gas Company. Mr. Phelps prosecuted. Prisoner, who pleaded "Guilty," had for about two months been lodging with a Mrs. Thomas at 14, Mile End Buildings, Mile End Road. She had a penny-in-the-slot gas-meter in her dwelling; and when the collector called on the 3rd inst., he found that some money was missing from the box. About 4000 cubic feet of gas had been consumed, and there was only 8d. in the meter. Mrs. Thomas, when spoken to, accused her lodger of having tampered with the meter. He said he was very sorry. He had broken it open, and taken out about 13s. On the following Saturday, prisoner went to Bethnal Green Police Station and gave himself up for the robbery; saying he yielded to a sudden impulse. He was sentenced to 14 days' hard labour. It was stated by an officer of the Company that, as these robberies were becoming very common, they meant to deal severely with any offenders discovered.

At the Woolwich Police Court, last Wednesday, before Mr. Kennedy, David Halsey, 11, a schoolboy, residing at 49, Princes Road, Plumstead, was charged with stealing 6s. 10d. from an automatic gas-meter at that address. Mr. E. Mander, one of the Inspectors of the South Metropolitan Gas Company, said there was a gas-meter on the penny-in-the-slot system at the prisoner's home. On going to remove the coppers from the box, witness found it empty; the index showing that 6s. 10d. had been abstracted. Prisoner said he found a key which fitted the meter, and he took the money. The Inspector said the locks had two levers; but he knew that keys could be had which would open them. He handed the Magistrate a bunch of keys which were used by the Company. Mr. Kennedy, on examining them, said the keys were evidently very common ones. The Company should provide better locks and keys for the protection of their coppers. The Police Magistrates were constantly having charges of this kind; and the Gas Companies were laying temptation in the way of children in having cheap and common locks on their automatic meters. He sentenced the prisoner to receive four strokes with the birch rod.

High-Pressure and High-Service Water Supplies.

At the Clerkenwell Police Court, on Thursday, before Judge Edge, Q.C., the New River Company sued Mr. J. E. Lawler, of Womersley Road, Crouch Hill, for £1 13s. 6d. for two quarters' water rate. Mr. Debenham appeared for the Company; Mr. E. Robins for the defendant. Mr. Debenham said the defendant resided in a house the annual value of which was £50. The house was more than 160 feet above high water mark; and this entitled the Company to charge an extra 1 per cent., which made the charge 5 per cent. on the annual value. Then the water was delivered more than 10 feet above the roadway, which entitled them to high-service charges, amounting to 14s. The Company also charged 3s. for garden watering. But if defendant said he had not used any water for this purpose, and would not do so, they would waive the 3s. Mr. Robins submitted that if the Company charged an extra 1 per cent. when the house was more than 160 feet above high-water mark, they could not also charge for high service, as surely these were almost identical. Mr. Debenham said in many cases where there was high service the house was not above high-water mark; and the reverse was also the case. Mr. Robins said there was only one high service, and they were really paying 14s. for that. Mr. Debenham said that the extra 1 per cent. was for the water going into the house. If the defendant had no high service, he would have to pay that. Evidence having been given that the house was 270 feet above high-water mark and the cistern 17 feet above the roadway, his Honour said he thought Mr. Debenham's argument was conclusive. It was proved that no water was used in the garden; and judgment for the plaintiffs was entered, by consent, for £1 10s. 6d. and costs.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Proprietors of this Company was held at the Bridge House Hotel, London Bridge, on Wednesday last, under the presidency of Mr. GEORGE LIVESEY.

The SECRETARY (Mr. Frank Bush) read the notice calling the meeting; and the seal was affixed to the register of shareholders.

The CHAIRMAN stated that there were now 7966 shareholders, of whom 1186 were employees and over 3000 were consumers. In moving the adoption of the report and accounts, he observed that it had been said that "good wine needs no bush." Applied to the Company, he hoped that his friend on his left (the Secretary) would not think that they did not need him; but he did think that when they had such a report to present, and when the position of the Company was what it was, it was not necessary for the Chairman to say much. The first point in the accounts to which he had to call their attention was in reference to the question of capital; and on this matter he had simply to state that they were continually reducing the capital relatively to the business. During the last five years the increased business had been met at an additional outlay of capital of only £2 13s. 4d. per ton of coal; and the increased business in the last twelve months—putting it in other words—had been met by an outlay of capital equal to £255 per extra 1,000,000 cubic feet sold, which was very low, when one considered that even £500 per 1,000,000 cubic feet for the whole business was not to be regarded as excessive, though, in their case, the total capital amounted to just £430 per 1,000,000 cubic feet sold. With regard to interest and dividend, it cost them in 1889 1s. per 1000 cubic feet to pay interest and dividend. He would give them his reason later on why he took 1889 as the starting point—in fact, 1889 might be considered the critical year of the Company's existence. It cost them now just under 9d. per 1000 cubic feet to pay interest and dividend. This would show them that, though the capital had been diminished considerably in proportion to the new business, the cost of this capital had been reduced in a still greater ratio. There were not many items in the accounts to refer to. The first and most important was the question of coal, which had cost them just 3d. a ton more in the past six months than it did in the corresponding period of the previous year. On the other hand, while they were at a disadvantage of 3d. a ton on coal, they were also at a disadvantage of 3d. a ton on tar. They had realized just 3d. per ton of coal less for their tar in the past half year than in the June half of 1897. He had said a good deal about tar at different times. He thought he might explain that the reason of this great drop in tar was owing to the failure of the Tar Products Association in their contest with the German buyers of products. It was said, in a now notorious reply, speaking of the policy of that Association: "This policy was subsequently adopted by a combination of tar distillers, with, as was to have been expected, disastrous results." It was true that the results had been disastrous; but this was to have been expected simply because the largest producer was persistently selling against the associated tar distillers, and thus playing into the hands of purchasers on the Continent. Of course, the combination failed, as it was bound to do under such circumstances. Coke and ammonia were happily improving. Ammonia had reached a very low figure; but it was considerably better now than it was a year ago. The same might be said of coke. There was another slight advantage—they were still creeping down in the cost of carbonizing; and for this credit must be given to the engineering staff. The cost of coal was almost entirely beyond the control of the management in any way except by choosing the right time to buy; but the working was to a certain extent, and within certain limits, under the management's control. The cost of carbonizing had been reduced by a further 1d. per ton; it was 2s. 3d. a ton last year, and 2s. 2d. this year. They might say: "What is a penny?" Well, it was £4000 a year, and therefore worth saving; and they were entitled to take credit for it. The net result of the working was shown in the report; and instead of, as for the last three or four half years, just holding their own, they were now in a position to come before the proprietors with a considerable surplus, as set out in the second paragraph in the report. In this paragraph, they stated how they proposed dealing with the surplus. He might state that this surplus was derived after charging everything that could properly and fairly be charged to revenue. They had not charged any item to capital that ought not to have been so charged. The works had been maintained, and old plant was renewed and restored, out of revenue; and the entire cost of everything they could properly charge to revenue had been so charged. They had a surplus, including £1802 brought forward, supposing they paid the same dividend as last year, of £21,265. The question was, What were they to do with this surplus? In the first place, the Directors proposed a slight increase of dividend. It was so small that it was perhaps hardly worth considering; the advance only being from 5¼ per cent. to 5⅓ per cent.—from £5 5s. to £5 6s. 8d. But they must go by easy and gentle steps now. There was, however, a reason for this increase, slight as it was. Their stock divided into multiples of £5. It came for the half year at 5¼ per cent. to an odd ¼d. on every odd £5; whereas making the dividend 5⅓ per cent., it would divide into even pence with all amounts of stock. It was convenient for book-keeping; and moreover it showed that the Directors felt they were on the upward trend. It had been their policy never to recommend an increased dividend unless they were certain that the advance could be maintained, because they felt it to be of extreme importance that their stock should maintain a steady value—not fluctuate up and down. The reason for this was that they had induced their consumers to a very large extent, and their employees, to invest in the Company's stock; and it was important for these small investors that the stock should not fluctuate, if they could help it. However, they felt that there was a reasonable prospect of maintaining this 5⅓ per cent.; and the next step he expected would be to 5½ per cent. But this would not be for some time to come, because they would not feel justified in paying a dividend up to the hilt. Therefore, before they paid 5½ per cent., they hoped they would be able to reduce the price of gas somewhat, in order to have a little margin. The extra dividend took £2333; and being entitled to pay 5½ per cent., they could add the difference of £4666 to the reserve fund, which would then amount, as stated in the report, to £100,458, and they would have £14,265 to carry forward. The business continued to increase. The report gave the figures as to the automatic meters for the half year; but in the year from June, 1897, to June, 1898, they had increased the ordinary meters by 3414, and the automatic meters by 11,019. He thought this would be considered satisfactory. They had not yet come to the end of this increase; but the end must come some day. They estimated some years ago that about 90,000 working-class tenements were not supplied with gas; and they had now fitted up 72,000 working-class houses and tenements. There could not, therefore, be so many more for them to capture. But the process was going on at a very satisfactory rate—5000 per half year, or 200 a week. He did not think he had anything further to say on the report; but there was a general question which he would like to deal with. It was very often said—and he thought that some people really believed it—that an increase in the price of gas did not check consumption, and that a decrease in price did not appreciably increase consumption. The reason for this belief was that it had happened not infrequently that when the price had been increased there had not been a diminution of consumption, but rather a considerable increase, which was due to colder weather prevailing under the higher price than prevailed in the corresponding period at a lower price. On the other hand, a reduction of price was sometimes followed by a higher thermometer; and no commensurate increase took place. But he thought that he had some facts and figures which would conclusively prove this question. He eliminated the thermometer altogether by making a comparison extending over a period of sixteen years between the North and South of the Thames. He would go back as far as the year 1832, and take the seven years from that year to 1889, and then the eight years from 1889 to 1897; 1889 being, as he had already said, their critical year, or the year when the crisis, so to speak, of the Company took place. Singularly enough it also happened to be a turning-point in regard to the Company North of the Thames. He would take the end of 1882, because the Company North of the Thames had then absorbed the London Company; and the price charged then on the North was 3s. 2d. per 1000 cubic feet, and on the South 2s. 10d.—or a difference of 4d. In the seven years following, the price North of the Thames was reduced by 8d.—from 3s. 2d. to 2s. 6d. per 1000 cubic feet; while on the South side it was reduced by 7d.—from 2s. 10d. to 2s. 3d. There was, therefore, in 1889 a difference of only 3d. per 1000 cubic feet in the charges on the North and the South sides of the river; the North having gained a penny. Now with respect to the relative increases of business. The Company on the South had rather less than one-third of the business of the Company on the North. Their increase was slightly better than the North. The Southern Company increased 42 per cent., and the Northern Company 27 per cent.; but the increase of the latter Company was nearly 2½ times as much in actual amount as that of the Southern Company. The increase in consumption of gas North of the Thames in those seven years was 3834 millions; and on the South side it was only 1597 millions, comparing 1882 with 1889. But what happened after 1889? In 1889, the great labour upheaval occurred, as well as the great strike in connection with their own Company. From 1889, they might date the period when their relations with their workpeople assumed an entirely different footing—one of friendliness and confidence. From 1889, also, might date the time when their consumers began to have a different feeling towards the Company; and he could not forget that at that time, when they had to give their consumers a short supply of gas, they met the Company in a most considerate manner. A good feeling was started then which he trusted had continued to the present time. Soon after that date they began the policy of offering their stock to the consumers; and since then all issues of stock had been offered to the consumers and taken up by them and their employees. They had thus about doubled the number of their shareholders. The policy they had gone upon had been to try and make friends—to endeavour to satisfy the consumers, to make them feel that the Company wished to treat them liberally, fairly, and considerately—and he thought the Company might be very well pleased with the result. He had given them the results for the seven years between 1882 and 1889; and he would now give them those from 1889 to 1897. The price of gas in the North—which was in 1889 2s. 6d. per 1000 cubic feet—was now 3s., or an advance of 6d. per 1000 cubic feet. In 1889, the price charged in the North was 3d. more than that charged in the South. The price in the South, however, had stood at 2s. 3d. per 1000 cubic feet. They had to increase it (because of the large advance in the price of coal) for a year or two; but it had gone down again to 2s. 3d., at which it now stood. The difference in the price charged on the North and the South sides of the Thames was at the present moment 9d. per 1000 cubic feet; and it had been gradually rising to this figure. In 1889, the difference in the price charged was 3d.; in 1890, it was 4½d.; in 1891, 5d.; in 1892, 6d.; in 1893, 7d.; and now it had got to 9d. What had been the effect on the consumption? It was this—that, whereas in the seven previous years the actual increase in consumption was nearly 2½ times greater on the North than on the South of the Thames, in the eight years to 1897 the increased consumption on the North side had been actually less than the increased consumption on the South side. The increased consumption in the South was 3196 millions; and in the North, it was 2917 millions. The increased percentage of the Company on the North was 16 per cent. on the gas sold in 1889; while the increase of the South Metropolitan Company was 56½ per cent. on the make of 1889. He had troubled them with these figures in order to prove—as thoroughly, he thought, as was possible—that a low price and conciliatory treatment of the consumers did tell. It had often been said: "What do the shareholders care? All that they trouble about is their dividend." He was bound to say that the shareholders of this Company had never manifested that narrow and sordid spirit; but whenever there had been a public question—a question of greater interest than the mere interest of the pocket—their shareholders had responded in a spirit that might be expected of Englishmen. But it might be said: "What does it matter, so long as you get your dividend?" It did matter. Every institution nowadays was on its trial; and if it could not justify its existence, that existence would become very precarious some day. So long as they could justify their existence, so long as they could show that they were rendering a service to the community—a service which the community could not well do without, a service satisfactory to the community—so long, he felt their position was secure. Therefore the shareholders of a gas company required to look at things in rather a broader spirit than the simple question of dividend.

He had no hesitation in saying that, in considering the interests of the consumers and of the other parties who were connected with the Company, the shareholders would find that their own interests would be best served. He did not believe that the position of the Company in regard to the dividend they were paying would be so satisfactory as it was at this moment, if they had not, with the shareholders' full approval and consent, endeavoured to do their best for the consumers; and it was because they had endeavoured to do their duty to the consumers that they were in their present position of prosperity. In regard to their endeavours to serve the consumers well, he felt that it was simply an act of justice to say that the staff of the Company—from the heads of departments down to the subordinate officers and the workmen—were animated by the spirit of doing what was right, fair, and considerate towards the consumers; and he believed that this had tended very largely to bring about the position which was held by the Company that day.

Mr. JOHN MEWS seconded the motion, which was at once carried unanimously without discussion.

The DEPUTY-CHAIRMAN (Mr. Simpson Rostron) then proposed that a dividend at the rate of 5½ per cent. per annum be declared. They would not, he remarked, require any assurance from him that the dividend recommended had been properly earned, because not only had they the certificate of their own Auditors, but also that of the Government official. As, however, there had been some reference in the newspapers to possible action in the shape of a Parliamentary Committee to inquire as to the result of the sliding-scale, and how it had worked, he might perhaps be allowed to point out what had taken place in regard to the dividend, the price of their gas, and other things which had entered into the prosperity of the Company within the last sixteen years. He said sixteen years, because 1882 was a period when, having amalgamated with the Phœnix Company, their work could be taken fairly in comparison with subsequent years. In that year they charged 2s. 10d. per 1000 cubic feet for their gas, and divided 12 per cent.; whereas they now charged 2s. 3d., or 7d. per 1000 cubic feet less, and the dividend had gone up to 13 per cent., or 1 per cent. more. In 1882 the dividend took 14d. per 1000 cubic feet of gas sold; whereas now the higher dividend and all capital charges took less than 9d. per 1000 cubic feet sold. But the important feature was what the public had got. In 1882, the value of a penny on the gas-rental was roughly three-and-a-half times the amount of ¼ per cent. dividend; now the value of a penny was seven times that of the additional dividend they were entitled to pay on a decrease of price. This was most satisfactory, because they must remember, as the Chairman had said, that they did not divide up to the hilt. They had about 2d. in hand; and therefore if they were forced—and they would have to be forced before they did it—to put up their price, they could do so without diminishing the dividend, which they therefore saw was very safe. On the other hand, they wished to keep faith with the public, who, they knew, had paid a certain premium for their stock in their belief in the maintenance of the dividend which was being paid at the time they bought such stock. If the dividend were diminished, they would find that the next time their stock was offered by auction, the public would say, "Once bitten, twice shy;" and the Company would suffer. They had more than doubled their business in the period mentioned; and the capital per ton had dropped about £1. All these figures were most important to those who understood on what foundation the prosperity of a gas company rested; and he had therefore ventured to draw their attention to them, in order that they might see the very satisfactory position of the Company.

Mr. E. H. CARDWELL seconded the resolution, which was carried unanimously.

The CHAIRMAN intimated that this closed the business of the ordinary meeting. They now had to hold an extraordinary meeting, and it was his duty to move—"That the scheme now submitted to the meeting for the election of Employees' Directors, made under the provisions of the South Metropolitan Gas Act, 1896, and the South Metropolitan Gas Act, 1897, be approved and adopted, subject to such alterations as the Board of Trade may suggest and the Directors agree to." He did not know that it was necessary for him to take up much of their time in dilating on this question. He might, perhaps, explain how it came about. In 1889 (the year he had already referred to), they started the profit-sharing arrangement with their workpeople, to whom they gave the option of either drawing out their annual bonus in cash or leaving it on deposit with the Company at 4 per cent. interest. To the Directors' surprise and gratification, nearly half of them left the money on deposit. The Board then thought that it would not be a bad thing if they gave the workmen the opportunity to invest the money in the Company's stock; and a number of them did so—to the extent of some thousands of pounds. But in 1894 they made a fresh advance. The whole Board were at that time perfectly unanimous. They felt that, if they could induce their workpeople to invest their savings in the Company, their interest in its prosperity would necessarily be more close and greater than if they had no such connection. In 1894, therefore, they, with the consent of the employees, altered the system of bonus—the profit-sharing bonus, which was declared annually. Half of it only was made withdrawable, and the other half had to be invested in stock. Since then, year by year, half the bonus had regularly been invested in the Company's ordinary stock; and, in addition, very considerable voluntary investments had been made by the employees. He did not know to what extent; but the amount was very large. The money had either been taken from the withdrawal account, or the men had put in other savings. This led to what seemed to him the following result: Some day, if the process should be continued, the time would come when the employees would become the owners of a very large proportion of the stock of the Company; and it had occurred to him that this question would then arise: "This stock is ours, and surely we ought to have some voice in its control and management." He did not think that anyone could deny the justice of this view. The only question was as to what the proportion or amount of the stock should be when such a claim could be justified and substantiated. Well, he would confess that his proposal was a forestalling of this period. They went to Parliament for the purpose of converting their capital in 1895; and they failed. They applied again in 1896; and they succeeded. In the Bill they took powers to authorize the election of certain workmen or employee Directors. In the Bill it was also provided that when the aggregate holding of the workpeople amounted to £40,000 of stock, the Directors might propound a scheme for carrying out the object mentioned. The employees' actual holding now was about £55,000 of stock, which was worth nearly £80,000. They had, in addition, about £30,000 on deposit at interest. The Directors had, therefore, brought their scheme before the proprietors for the latter's sanction. It would then have to get the sanction of the Board of Trade; but he might say that it would have been unwise to bring a scheme before the proprietors without having some idea of what view the Board of Trade might hold in the matter. He had, therefore, held unofficial communication with the Board of Trade. His communication had been unofficial, and the reply he had received had been entirely unofficial. But he had made such communication with the Board of Trade, whose view, generally, he knew of the matter. The scheme which had been sent to every shareholder was very much on the lines which they expected would be approved by the Board of Trade. He was, however, in a little bit of a difficulty. He had told them that in regard to the shareholding, the Board had been entirely and heartily unanimous; but in regard to the question of allowing the workpeople to have a representation on the Board, he did not come before the proprietors with the full authority of the Directors. Some of his colleagues—he would not say were opposed to it, but they were doubtful whether the scheme would work. He was not going to tell them that he was sure it would work; by no means. He thought, however, that it was worth the trial; and he would like to see it tried while he was there and able to devote himself to the Company. But whether it was going to succeed or not would depend upon the workpeople themselves. If they elected suitable men, the fears of his colleagues who were in doubt about the matter would be proved to be groundless; and he was quite certain, from what he knew of them, that they were not narrow-minded men, and that if they found their fears were groundless, none of the Directors would welcome the workmen Directors more heartily than those who were now afraid of what might happen. The question, then, was how it was going to work; and this could only be proved by actual experiment. It might be said: "Why not let other people try it." Well, it so happened there was no one else to try it. He was not a "Little Englander;" and in regard to the business of this Company, he was not narrow-minded. The Company was part of the great community of the country, and they had their part to play; and if it had been brought to them that they were to try a great experiment, which, if it turned out to be successful, would be greatly to the advantage of the country, and greatly to the advantage of both capital and labour, then he maintained that it was not for them to shirk the matter. There was no one else to try the experiment, because there was no other commercial undertaking in this Company's position. He, therefore, felt that he might ask the shareholders to give their consent to this proposal. What were the workmen Directors to do? They were not to take a narrow view of their duties. When the present Directors were elected they might have had various views as to this, that, and the other; but when they came on to the Board, they had three interests to look after. He did not know which he was to put first; but they must all be mentioned. They had to consider the consumer, they had to consider the employee—they had to do justice to both of these—and they had also to consider the shareholders, and do justice to them. They had to look at all the three parties who were vitally interested in the Company—the consumers, the employees, and the shareholders; and they had to do justice all round. The difficulty would be to get the representatives of a class to rise to this condition. He discussed the matter with the late Mr. Mundella, than whom there were very few men who had had larger experience of these questions, or who had a sounder judgment upon them. Mr. Mundella said to him: "I like the idea very much, but what I am afraid of" (and Mr. Mundella, who was generally regarded as favouring the labour side, had the candour and honesty to speak to him of what he was afraid of) "is that the workman may not rise to the position; that he will regard himself as being the representative of a class" rather than as the representative of the three classes he had named—to look at the interests of the Company as a whole, and do his best for them. He had talked to others who knew a great deal about these things; in fact, he was talking only the previous week to Earl Grey on the subject. His Lordship asked him to meet him and tell him what they were doing; and Earl Grey said to him: "You need not be afraid. You may depend upon it that the workpeople will rise to the position, and they will elect good representatives." There was perfect freedom of election. The workpeople could elect whom they pleased; and if they would only select capable, sensible, and fair-minded men, he had no fear of the result. If, on the other hand, they elected the glib talker, the man who promised this, that, and the other—if they elected men of that sort, then the thing would fail, and it would be their own fault. He was speaking there in the presence of a number of the men who were shareholders; and he should tell them all this again when the time came to do so, if it did come. At any rate, working people had had very little experience hitherto—had had no opportunity of gaining experience in general business affairs. They had done their work and taken their wages; but they had no opportunity of learning about the difficulties of carrying on a great business. He therefore hoped that when they sent their representatives to the Board—if the proprietors assented to the proposal—they would see that there was a larger view to be taken of the business of this great country (of which the Company was a small part), and they would have their eyes opened to this larger view, and would in course of time be able to disseminate the larger view among their fellow-workers. He hoped also that they might receive some useful hints from them. The men who were doing the work often found out things which the Directors or even the officials could not discover; and if they would give them hints and suggestions whereby they could improve their working, he was quite sure that he spoke for the whole Board when he said that they would be willing to accept (and gladly accept) any suggestions they might make. He did not know that he had much more to add. He wanted to be a means of educating and elevating the workmen from the position of wage-earners to that of capitalists or employers. If they responded to it, well and good; if not, the scheme provided that at the end of three years it would fall to the ground. He had been told, "If you once start a thing of this sort, you cannot stop it; if it were stopped there would be another strike." He had no fear whatever of such a contingency. He was quite certain that, if the thing failed, the workmen would themselves recognize that it was a failure and would acquiesce, without a word of dissent, in the lapsing of the scheme. The scheme had been circulated among the proprietors. The main part of it was occupied with a description of how the voting was to take place. They had six stations;

and the difficulty was so to arrange the voting that fair play should be given all round. He thought that they contrived this; and some valuable suggestions had been made on the point by the Board of Trade, which they had adopted. As to the qualification of an employees' Director, the provision was as follows: "The qualification of an employee Director shall be the having been not less than seven years in, and continuing in, the employ of the Company, and the having held for not less than twelve months prior to the date of election, and the continuing to hold, not less than £100 in the stock of the Company." They had over fifty workmen from whom to choose; fifty-two of their workpeople had £100 of stock or more—some had as much as £800—and were therefore qualified. With regard to the question of fees, a man could not be a servant and a master at the same time; and when acting in the position of a Director the employee member of the Board would not be under the orders of anyone as a servant, and therefore his duties and pay as a workman would be suspended while he was acting as a Director. The clause on the subject of fees was as follows: "The employee Directors shall have their ordinary duties and the pay attaching thereto suspended during the time that is found to be necessary for their duties as Directors. The fees shall 'bear some proportion to the amount of their qualification,' relatively to those of ordinary Directors, which are equal to one-fifth part of the nominal value of their qualification, and will accordingly be about £20 per annum. The fees for their service as Directors shall be the amount they would have earned if they had been at their ordinary employment, *plus* 10s. 6d. for each weekly attendance." The Act of Parliament limit was that the fees paid to an employee Director should not be more than four times the amount of his ordinary day's pay. But they were starting with the moderate fee of 10s. 6d. in addition to the amount the workman Director would have earned if he had been at his ordinary employment. If the scheme should fail, it would lapse in three years' time; if it succeeded, they must come before the proprietors again for another scheme. They therefore did not commit themselves to anything irreparable, but merely to a three-years' experiment.

Mr. Robert Morton observed that there was a certain amount of fitness in his seconding the resolution. He had had a life-long connection with workmen. He had been a workman himself (during his apprenticeship) and a master; and he had every confidence that the men would make a good choice. If they did so, he was sure that the scheme would be greatly to the advantage of the Company as well as to the men themselves. He had great pleasure in seconding the resolution.

Mr. Daniel Stock said that he regarded the proposal as a very excellent one, and he warmly supported it. Ever since Mr. Livesey had been Chairman of the Company, he had done all he could to promote its interests in whatever he had proposed. He saw no reason why the scheme should not work successfully.

A Shareholder asked what proportion of workmen Directors there would be under the scheme, when it was fully developed, to the ordinary Directors.

The Chairman replied that the proportion would be two to seven; and it could not exceed three. They had provided in the scheme that the wage-earners—those who were paid weekly wages—should have the power to elect two of their number, and that those on the staff who were paid by salary should have the power to elect one member. The proportion then would be seven ordinary Directors to three employee Directors. But they scarcely ever went to a vote; and he did not think there would be any division on the Board.

A Shareholder inquired what was the number of employee shareholders who had the right to vote under the scheme.

The Chairman: 1186. He might state that the smallest amount of stock that anyone could hold was £5; but in many cases this was accumulated without any effort under the revised profit-sharing arrangement of 1894. They had thought it would not be wise to let any man have a vote unless he voluntarily increased his holding to at least £10 of stock.

Mr. Hogarth remarked that the scheme they were submitting to the proprietors was undoubtedly a novelty, and might prove to be an object-lesson. That being so, he was very glad to find that the Directors had approached it carefully and in a right spirit. He was himself a thorough convert in the matter. By utilizing the best brains of their workpeople in grappling with the affairs of such a great Company as theirs, the best results would be obtained. He felt that there would be no difficulty in admitting their men to the Board so long as they got the right men elected from among the workpeople; and the scheme might prove to be a pioneer for many other companies.

Mr. Mitchell expressed his regret at having to be on the opposite side. He could not say that he approved the scheme. The Chairman had pointed out that his chief reason for putting it forward was the large holding the workmen had in the Company. Over 1100 workmen had a small interest in the Company as shareholders; but why this class-legislation, why this dividing-up of the shareholders into classes to be represented on the Board? He should imagine that the interests of the workmen were as carefully safeguarded by the present Board as they would be by a Board *plus* the workmen Directors—he meant that the interests of the small shareholders of the Company were, in his opinion, as carefully guarded as those of the largest holders of the Company's stock. He could not see why the Company should be, as it were, subdivided into sections, and thus represented on the Board. He understood the Chairman to say that the men might be able to give useful technical hints as to the working of the Company. He was quite sure that the Board, as at present constituted, would be only too glad to receive any hints from the men as to improvements which might be effected in the working—to accept such hints, and reward them properly, without electing workmen Directors on the Board. The workman shareholder had the same power of electing representatives on the Board as any other shareholder.

The Chairman stated that the ordinary shareholder had one vote for £100; therefore it would cut out all but 52 of the workman shareholders in the voting for ordinary Directors.

Mr. Mitchell (continuing), said he still thought that the workman's interest would be as carefully protected as it would be if he had £1000 of stock in the Company. On what grounds were the present Board elected? He supposed because they were business men—men of experience and knowledge of affairs. No one had a higher opinion of workmen than he (the speaker) had; but what experience had they had? They had not had the opportunity of acquiring experience. He knew that the seconder of the resolution had been a workman; but Mr. Morton did not step out of his position as a workman and at once become a Director. On the contrary, he passed through a long experience before attaining his present high position. And granted that a workman Director had all the fitness and ability to act as a member of the Board, why should he receive only 10s. 6d. per meeting? and that was a question which he would naturally ask himself. He should say that the workman Director, from the latter's point of view, would be entitled—although he could not do so under the present Act—to expect the same fees as the other members of the Board; and why should he not, if he was equally taking part in directing the business of the Company. He (Mr. Mitchell) could not, however, see that this classification on the Board was for a moment required. The man was taken from his position as a workman one day, and was put into the position of a Director the next day; and he (the speaker) considered it probable that a man going through such an experience as this would "lose his head." When a man occupied the position of a workman, he was a workman; and he could not help it. He might rise to a much higher position in time; and it was perhaps easier in this country than in any other to rise from the lowest step of the ladder to the highest. But the rise must be by a series of steps, and not at once from the bottom to the top.

The Chairman observed that if there was no further discussion on the matter, he would proceed to reply. He thought that the last speaker had not grasped the idea; he looked at the matter from a narrow point of view. The proper point of view was this: Capital and labour were at war; and the feeling between capital and labour was very similar to that which had existed for so many years—and he was afraid still existed—between France and Germany. What they wanted to do was to change all this; to have, instead of a state of war, and antagonism, and distrust, a state of peace and mutual confidence. He thought that mutual confidence could only be obtained by trust. If they showed distrust of any man, he would not trust them. He had stated that he did not come before the meeting with any feeling of undue confidence in the matter. He always considered that, "Let not him that putteth on his armour boast himself as he that putteth it off." He would be able, three years hence, if he should be spared, to tell them more of what the scheme was going to do; but he was satisfied that it was worth a trial. They had succeeded—no one could deny this—in a way that no one could ever have expected in promoting a relationship between their employees and themselves such as he never before knew to exist, or even hoped to see in his time. He wanted to go a little further, and show their employees that the Directors had nothing to conceal—that their business was done in the fairest manner possible. He believed that it would be of great advantage to the Company if the employees were made to know this. He asked the meeting to remember that, next to the item of coal, the amount paid for labour was the largest figure in their expenditure. They expended more than half a million in the half year, and considerably more than one-third of the amount went in wages. It was highly important that the men who gave their work for wages should have a closer interest in the Company, and that they should have a desire to benefit the Company. Their workmen were already shareholders; let the Company go a step further, and allow the men to have not only a share in the profits but also a share in the responsibility. The remark was made to him once by a man of very extensive experience, that if they gave a man responsibility it entirely altered him. Let a man feel that responsibility rested on him, and he would act considerately and judiciously; whereas, if he did not bear responsibility, he might give vent to his feelings in a way which might not be either considerate or judicious. The interest of the workpeople was safe, he believed, with the present Board; but they wanted the workmen to know this, and he did not think that they could be assured of it in any better way than by coming among the Directors and seeing what the latter did. He felt that it would be a great benefit to the Company if the scheme succeeded; and he did not anticipate that any harm would arise if it failed, although if this happened he should be extremely disappointed. If the scheme succeeded, their Company would have done something for the industry of the kingdom of which they might well be proud. He then put the motion to the meeting, and it was carried with two dissentients.

On the motion of Mr. Stock, a cordial vote of thanks was passed to the Chairman and Directors for the conduct of the Company's business in the half year, "and especially in connection with this scheme."

The Chairman, in reply, said it was a great satisfaction to the Board to feel that they had such a body of shareholders to deal with. It was a great stimulus to them to do the best they could for the Company; and he assured them that this expression of their confidence would not be forgotten. He might say that he had now completed fifty years in the Company's service; and it was a great satisfaction to him that, on the completion of his fiftieth year's work with them, the scheme which had been put before them should have been so harmoniously carried by the shareholders. He then proposed a vote of thanks to the officers and employees generally of the Company. He was bound to say that a better set of officers it would be impossible to find. Not merely did they do their duty, but the great majority of them—he did not say every man among them—took a real interest in the welfare of the Company. He might say the same of the workmen. There were some black sheep among them; but, taking them as a whole, they did their work thoroughly well.

Mr. John Mews seconded the resolution; and it was put and carried unanimously.

A Lady Shareholder, whose name did not transpire, expressed cordial approval of the scheme and high appreciation of Mr. Livesey's services during the fifty years that he had been connected with the Company. She had herself been interested in the Company for forty-one years.

The Chief Engineer (Mr. Frank Livesey), in reply, stated that they had been for some time partly reconstructing all their old works. This told heavily on the revenue account; but as it reduced the cost of manufacture, and enabled them to make more gas at the old works, he was sure that the shareholders would not be discontented at the outlay. In fact, for the last four or five years the large increase had been to a great extent taken up by the old works. They had still something to work for; and they hoped to continue to receive the shareholders' approval.

The Secretary also responded on behalf of himself and those under him. He reminded the proprietors that when they met last February they were all deploring the low price of residuals. Fortunately, prices were now very much better—both for coke and ammonia; but, as the

Chairman had explained, tar did not rise. There was another satisfactory feature in the accounts—that for the first time for several years they were able to add to the reserve fund out of the divisible profits. In 1892 the fund stood at £37,000; whereas it now stood at rather over £100,000.

The proceedings then terminated.

SHEFFIELD UNITED GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the 87th ordinary general meeting of the shareholders on the 13th prox., they remark that, bearing in mind the extraordinary mildness of the winter, and the large consumption of gas during the first six months of 1897 (which exhibited an increase of 11·15 per cent. on the corresponding period of 1896), the increase during the past half year of 49,688,000 cubic feet, or 4·7 per cent., must be regarded as satisfactory. The total receipts in the six months ending June 30 amounted to £149,905; while the expenditure was £109,287—leaving a balance of £40,618 to go to the profit and loss account. After paying the usual dividend, there will be a balance of £21,992 to be carried forward; the surplus on the past six months' working being £86 10s. 8d. This amount, the Directors point out, would have been larger but for the reduction of 2d. per 1000 cubic feet in the price of gas which has been in force since April 1. A net sum of £31,440 was expended in the half year on capital account; £29,285 being for new buildings and plant. There is now an unexpended balance of £41,044 on this account.

PORTSEA ISLAND GAS COMPANY.

The Half-Yearly Meeting of this Company was held at the Offices, Commercial Road, Landport, last Saturday—Alderman Sir JOHN BAKER, M.P., the Chairman, presiding.

The report presented by the Directors stated that the quantity of gas manufactured during the past six months had been 362,026,000 cubic feet, of which 344,908,500 feet were sold for public and private lighting; and after allowing for the gas used at the offices and works, there remained a balance of 16,092,900 cubic feet unaccounted for, which was nearly 4 million cubic feet more than in the corresponding period of last year. The usual dividends of 13, 12, and 5 per cent. (less income-tax) on the several classes of shares were recommended; leaving £25,446 to be carried forward. With respect to the internal management of the Company, the Directors stated that for some time they had been of opinion that, owing to the growth of the business and for other reasons, it would be beneficial to the Company that the offices of Secretary (or Clerk) and Engineer should not be held by the same person; and consequently the secretaryship, which became vacant by the resignation of Mr. S. B. Darwin, had been filled by the election of Mr. C. Jenkins, who had for twenty-five years been in the service of the Company. The Directors having also determined to appoint an Assistant-Engineer, 60 applications for the post were received; and Mr. J. D. Ashworth, who was for twelve years in the service of the Gas Committee of the Manchester Corporation, was selected. Mr. Darwin had finally severed his connection with the Company on the 14th of July, when he resigned the post of Engineer and Superintendent, and since that date Mr. Ashworth had (provisionally) been satisfactorily performing the duties of Engineer to the Company. In concluding, the Directors stated that, with respect to the condition of the works, they had consulted Mr. Alfred Colson, the Gas Engineer of the Leicester Corporation; and, in order to put them into a thorough state of efficiency, the cost would probably be £2000. The total income for the half year had been £54,573.

The CHAIRMAN opened the proceedings by congratulating the meeting on the continued prosperity of the Company, as was shown by the report. Referring to the matter of the separation which had occurred between the Directors and their late Engineer, he said the former had been influenced by the fact that they had not only to look to the interests of local people who were shareholders, but to a vast number of others who, having invested their money in the undertaking, never attended the meetings from the fact that they were resident in all parts of the country. For a long time there had been differences of opinion between the Directors and the late Engineer, owing to the arrangements at the works not being so conducted as the Directors could have wished. This, indeed, had existed over a period of more than two years; and though they much regretted losing the services of so old a servant as Mr. Darwin had been, they felt that in the interest of the great body of the shareholders—which, of course, was the interest of the Company at large—it was absolutely necessary that the changes which they had inaugurated should be deferred no longer. The Directors had fully considered the matter in all its bearings; and they had felt that things had been so slack at the works that a catastrophe might have happened at any moment—a catastrophe which, if it had occurred, would have been sufficient to sink a battle-ship, and caused damage over a great portion of the important town in which their works were situated. There was, he added, the utmost good feeling in the minds of the Directors towards Mr. Darwin, but they could no longer postpone their decision that a change was desirable in the line he had indicated.

Lieut.-Col. C. LANYON OWEN, J.P., moved the adoption of the report and accounts; and, in doing so, referred to the continued inflow of receipts as the results of their manufacture of an illuminant which had been in use for so many years, and with so much usefulness.

Sir W. D. KING seconded the motion.

Mr. FLOWERS, in supporting the resolution, spoke very warmly of Mr. Darwin from the knowledge he had gained of him as a resident in the town; but, of course, he had not, he said, known how matters had stood officially between him and the Directors.

A SHAREHOLDER suggested whether it would not be possible to grant to Mr. Darwin some bonus or allowance.

The CHAIRMAN said the Directors could not see their way clear to carrying out such a suggestion, more especially as Mr. Darwin had, in the office he had held, been receiving no less than £1100 per annum.

The motion was then put, and was carried without a dissentient voice.

PROVINCIAL GAS AND WATER COMPANIES.

We commence to-day our usual notes on the progress made by Gas and Water Companies in various parts of the kingdom whose reports and accounts come to hand about this time.

Gas Companies.

The annual meeting of the Biggleswade Gas Company was held on the 5th inst., when the Manager (Mr. G. R. Casterton) reported an increase of 771,000 cubic feet in the sale of gas, also an increase in the quantity of coke sold. The result of the year's work was 797 tons 13 cwt. of coal carbonized, and 8,625,000 cubic feet of gas made, of which 7,861,300 cubic feet were sold, or an average of 9848 cubic feet per ton. After placing to the reserve fund the sum of £183, making the amount of that fund £650, a dividend of 7 per cent. per annum was declared, and a balance of £24 carried forward.

In the year ending June 30, the Bridport Gas Company sold 13,266,300 cubic feet of gas for private consumption, as compared with 13,019,800 cubic feet in the preceding year. The revenue from this source was £2489, against £2442; and the total receipts were £3692, as compared with £3654. The expenditure was £2713, against £2705; and the balance carried to the net revenue account was £978, against £949. The amount available for distribution is £1443; and at the meeting of the Company to-day the Directors will recommend the payment of 8 per cent. on the ordinary shares, free of income- tax, and 5 per cent. on the preference shares, less income-tax. This will absorb £937, and leave £506 to be carried forward.

At the half-yearly meeting of the Bristol Gas Company next Thursday, the accounts to be presented will show that the sale of gas produced a revenue of £95,582 in the six months ending June 30, as compared with £94,224 in the corresponding period of last year. The returns from the sale of residuals amounted to £23,688, against £25,570; and the total revenue was £121,983, against £122,710. The expenditure on the manufacture of gas came to £79,326, as compared with £76,765—coal and oil figuring for £49,358 instead of £45,957; and the total outlay was £97,134, against, £94,263. The balance carried to the profit and loss account is now £24,848; whereas this time last year it was £28,447. The amount available for division is £35,830; and the Directors recommend a dividend at the rate of 5 per cent. per annum. This will take £23,837, and leave £11,993 to be carried forward. The statements relating to the manufacturing operations of the Company show that 84,525 tons of coal and 9545 tons of cannel were carbonized in the six months covered by the report; the residuals produced being: Ordinary coke, 56,645 tons; cannel coke, 3648 tons; breeze, 8676 tons; tar, 1,032,497 gallons; and ammoniacal liquor, 2,008,512 gallons.

Notwithstanding an increase from £680 to £1659 in the assessment of the Bury St. Edmunds Gas Company, the Directors in the past half year added £250 to the reserve fund, bringing it up to more than £4000. At the recent half-yearly meeting, reference was made to the electric lighting scheme of the Corporation, and an opinion was expressed that the townspeople did not want it. At the electric light inquiry, the idea of the Paving Commissioners having years ago provided £2500 for the Company, on certain conditions, was ridiculed; but the Chairman (Mr. F. C. Andrews) pointed out that through this arrangement gas, for which private consumers were charged 3s. 6d. per 1000 cubic feet, was supplied for public lighting at 2s. 3d., and street lamps and brackets furnished by the Company would have cost the borough more than £1000. Dividends of 11s., 8s. 6d., and 8s. per share on the different classes of capital were declared; and a vote of thanks was accorded to the Manager (Mr. Alex. Mitchell).

At the half-yearly meeting of the Cambridge Gas Company, the Chairman (Mr. E. H. Parker) stated that the accounts presented, which were made out in the form required by the Gas-Works Clauses Act, showed the balance carried to the profit and loss account to be £6119; the corresponding figures for the year ending Midsummer, 1897, being £4238. However, though they had made an increased profit, it was not so large as it appeared from the figures, because they had not debited against the £6119 the following items: Interest on mortgage bonds, £594 17s. 3d.; income-tax, £340 19s. 10d.; and another small item bringing the total up to £964 3s. 4d. The items in the new account were debited in the profit and loss net revenue account. Therefore the profits were reduced by £964; leaving £5155. These figures, as compared with the profit made for the half year ending Midsummer, 1897, which were £4239, showed that during the past six months they had realized an increased profit of £916. The reasons for the increase were, he thought, that the gas rental had risen a good deal owing to the greater use of stoves for cooking purposes, and also owing to the re-organization of the coke department at the works. The sale of coke for the half year showed an increase of £345, which was very satisfactory indeed. A better result had also been obtained from the carbonizing. The new works were expected to be ready for use about the end of September. The report of the Directors, in which they recommended the declaration of dividends at the rates of 10 and 7 per cent. per annum, was adopted. At the close of the ordinary business, the meeting considered the course to be pursued with regard to an action commenced against the Company by the holder of stock certificates fraudulently obtained and issued by the late Secretary. The Chairman said the total defalcations, as far as manipulated gas stock, certificates, and mortgages went, amounted to £13,455. They had actions threatened against them involving the sum of £8995. They had taken the opinions of three Counsel as to their liability on the share certificates and mortgages, and they were distinctly advised that they were not liable. The matter was discussed in private.

At the half-yearly meeting of the Chester Gas Company on the 4th inst. the accounts presented showed a sum of £3499 available for division; a balance in hand of £342 being carried forward. The Chairman (Mr. J. Gamon), in moving the adoption of the Directors' report, stated that they had exercised economy in connection with the revenue account; and the saving of expenditure was something like £400. The price of coal, however, had gone up, and was now 9s. 6d. instead of 8s. 11d. per ton. The sale of cookers had very largely increased. This time last year they had 345 out on hire, and they now had 429, being an addition of 20 per cent. The ordinary consumption had augmented, though not very largely, but they were still advancing, in spite of the fact that some consumers had ceased through using the electric light. The Company now had 3615

consumers, against 3534 at the corresponding period last year, while they had 751 automatic meters out, against 481. The consumption through these meters had reached a larger figure than before; being an average consumption of 4859 cubic feet, against 3652 cubic feet for the corresponding period last year. The amount received for gas sold during the half year came to £11,819, against £13,049 in June, 1897. There was a reduction in price, which had materially diminished their income. If they had had the old prices, they would have made up £774 of the deficiency; and there was the fact that they supplied 3 million cubic feet less gas. This was not altogether due to the use of the electric light. There was the extraordinary state of the winter, which continued far into the end of March; and this accounted for much of the deficiency. Ever since April they had an invariable rise week by week; and the previous week there was an increase on the corresponding week of the previous year by 213,000 cubic feet, due to automatic meters, extensions, and cookers. In time they would recover any loss sustained through the electric light. The report and accounts were adopted; and interim dividends of 5 and 3½ per cent. for the half year were declared.

The quantity of gas sold in the first half of the year by the Dorchester Gas Company was 14,334,500 cubic feet—an increase of 800,000 cubic feet as compared with the corresponding period of 1897—and it produced £2720; the total revenue being £3321. The expenditure amounted to £2283; so that there was a sum of £1038 to go to the net revenue account. The amount available for division was £1176; and at the meeting last Tuesday, a dividend of 10 per cent. (free of income-tax) was declared on the ordinary capital, and one of 6 per cent. (less income-tax) on the preference capital.

The Faversham Gas Company have had a successful year's working. The amount received for gas was £224 more than in the previous year. The net profit amounted to £2832, which with £1341 brought forward and £14 interest on investments, less £59 interest payable, make a total disposable sum of £4128. From this a dividend of 9 per cent. has been declared, which will absorb £2419. The Company are proposing to construct additional works, which will necessitate an increase of capital.

The accounts of the Keswick Gas Company for the year ending June 30 show that the revenue was £3325, and the expenditure £2036; the balance carried to the profit and loss account being therefore £1289. Adding to this the amount brought forward, £497, and deducting £84 for interest on loans, there remains £1702. From this the Directors propose to set aside £110 for depreciation, and add £194 to the mortgage redemption account; leaving £1398 available for distribution. They will recommend the declaration of dividends at the rate of 8½ per cent. per annum upon the original, and £5 19s. per cent. per annum upon the additional capital. This will absorb £845, and leave £553 to be carried forward.

Last Thursday the shareholders of the Maidstone Gas Company met to receive the Directors' report and accounts for the year ending June 30 last. These disclosed the favourable balance of £13,750, from which the Directors recommended a dividend at the rate of 11 per cent. per annum, less the interim payment of 5 per cent. The figures indicated a continued expansion of business. In their report, the Directors recorded, with regret, the retirement of Mr. Ambrose Ward, who for more than 32 years presided over the Board, and also of their colleague, Mr. John Arkcoll. In the course of the remarks made by the Chairman (Mr. W. Haynes), in moving the adoption of the report, he mentioned that a new bench of retorts was being completed, which would enable the Company to carry on the manufacture of gas in a somewhat more economical way even than at present.

The business of the Malton Gas Company continues to extend, mainly owing to the growth in the demand for prepayment meters and cooking and heating stoves. The balance of profit for the past half year is £1313; and the amount available for dividend, after paying interest on borrowed money, is £2167. At their meeting last Wednesday, the shareholders decided to pay a dividend at the rate of 5½ per cent.

The report presented at the half-yearly general meeting of the Newport (Mon.) Gas Company last Wednesday showed that upwards of 106 million cubic feet of gas had been sold during the six months ending June 30, bringing in £16,541; and the total revenue was £22,827. There was a profit of £4896. Under the supervision of the Company's Engineer (Mr. Thomas Canning), 11,832 tons of coal and 1230 tons of cannel were carbonized; the residuals produced being 8964 tons of coke, 793 tons of tar, and 414,395 gallons of ammoniacal liquor. The Chairman (Mr. E. J. Phillips, J.P.), in moving the adoption of the report, said there had been an increase of 2 per cent. in the quantity of gas manufactured, and 250 tons more coal had been carbonized, as compared with the previous half year. Though they had made 2½ million cubic feet more gas than in the corresponding half of 1897, there had been a decrease of £88 in the cost of manufacture. Mainly in consequence of the strike in the coal trade, they had had to pay £1000 more for coal; on the other hand, however, they had been able, owing to the same cause, to clear off a very large accumulation of coke. The works had been extended at an expenditure of £2842; an additional mile of new mains had been laid; and 131 new services put in. There had been a serious increase in the rates and taxes, which amounted to £576. The Company gave notice of appeal; but eventually the matter was compromised. In order to pay the statutory dividend, £447 would be taken from the reserve; but if the strike were settled there would be no need for this. The report was adopted; and the maximum dividends were declared.

In the six months ending June 30, the Poole Gas Company received £3013 from the sale of gas, and had a total revenue of £3849. The expenditure being £2680, there was at the close of the half year a balance of £1169 to go to the profit and loss account, as compared with £1240 this time last year. The amount divisible was £5776; and at the meeting on Monday last week maximum dividends (less income-tax) were declared upon all classes of stock. Under the supervision of Mr. W. Davis, 1800 tons of coal were carbonized; and of the total quantity of gas produced, 13,398,800 cubic feet were sold to private consumers, and 1,362,900 cubic feet for the public lamps not lighted by contract.

The half-yearly meeting of the Tunbridge Wells Gas Company was held last Wednesday—Mr. Alderman Delves presiding. The report presented showed the total quantity of gas made to be an increase of 4¾ per cent.; while there were 370 tons more coal used. Unfortunately, coal had gone up in price, and it was anticipated that this would be felt in the current half year. The more extended use of gas was shown in every branch of private consumption. The decrease was in the public lighting; but this only represented 5 per cent. of the total revenue. Prepayment meters showed satisfactory results; and the Directors anticipate a continued addition to the number in use.

The accounts to be presented to the shareholders of the Weymouth Gas Company at their meeting next Thursday show that in the half year ending June 30 there was an increase to the extent of 4·65 per cent. in the sale of gas, as compared with the corresponding period of 1897; the figures being 29,842,800 cubic feet and 31,231,900 cubic feet respectively. This produced £5919; and the total revenue was £7192. The expenditure on the manufacture of gas was £3904—the 3852½ tons of coal used costing £2821; and the total outlay was £4995. The balance carried to the profit and loss account is £2197; and the balance available for distribution is £3758. The Directors will recommend the payment of a dividend at the rate of 5 per cent. per annum, subject to deduction for income-tax. The growth of the Company's business has necessitated extensions of the works and mains, which have been carried out under the supervision of the Manager and Secretary (Mr. J. Lowe).

The result of the past half-year's working of the York United Gas Company was a balance of £8022; the revenue having been £32,858, and the expenditure £24,836. Adding £243, the interest from the reserve fund, made a total of £8265 to meet the dividend. There was an increase of 4·3 per cent. in the consumption of gas as compared with the first half of 1897. In order to secure the advantages of modern methods of gas manufacture, the Directors have determined to put up an installation of plant for the manufacture of carburetted water gas. Enlargements and extensions of mains have been carried out to meet the increasing demands for gas. To satisfy their general requirements, the Company have just received parliamentary powers to raise £100,000 of additional capital at 4 per cent.; the new stock to be issued under the auction clauses. At the recent meeting of the Company special allusion was made to the fact that, with a turnover of something like £30,000 or £40,000, the bad debts only amounted to 20 guineas—a fact which the Company's Engineer and Secretary (Mr. C. Sellers) cited with satisfaction at an inquiry held by a Committee of the York Corporation concerning the collection of their rates. The usual dividend of 5s per share was declared.

Water Companies.

The Cambridge Water Company recently held their half-yearly meeting, when the Directors recommended dividends at the rates of 10 and 7 per cent. per annum, less income-tax. They reported that the final settlement of certain claims arising out of the fraudulent transactions of the late Secretary, which were referred to in the last half-year's report, had been unavoidably postponed. They had decided that the secretarial department should in future be carried on at the Company's office, and had appointed as Secretary Mr. William Wythers Gray, the Engineer and Manager. His report set forth that water had been supplied to 177 new premises, the rental from which would be £153 per annum; and that the total number of premises supplied was 14,961. Reports were submitted by Professor Kantback and Mr. E. F. Smith, F.C.S., testifying to the good quality of the water supplied by the Company. The Chairman (Rev. Dr. Perowne), in moving the adoption of the Directors' report, referred to the cloud of anxiety under which the Company were at the time of the last half-yearly meeting through the disappearance of their late Secretary, and said they could now see their way out of the difficulties they had had to encounter. The report was adopted.

At the 83rd half-yearly meeting of the Chester Water Company last Thursday, the report presented by the Directors stated that the result of the six months' working had been a surplus of revenue over expenditure of £2807, to which had to be added the balance of £5671, making a total of £8478. The interest on the preference capital required £450, leaving a balance of £8028. It was recommended that the usual statutory dividends be paid, free of income-tax. This would absorb £1890, and leave £6138. The Chairman (Mr. W. Brown), in moving the adoption of the report, stated that the Directors had resolved to reduce the bath charges per quarter by about one-half. They would have been glad to abolish the rate altogether, and might have done so but for the foolish expenditure they had to incur in opposing the Dee Sluices Bill. The reduction for baths would mean a loss of about £350 a year to the Company. Mr. F. Roberts, in seconding the motion, said that those who advocated that the Company's water should be taken from a point farther up the river or from deep wells, had not considered what it would involve. If they obtained their supply of 2 million gallons a day from the Vyrnwy mains, at a cost of 8d. per 1000 gallons, it would mean an expenditure of something like £28,000 a year, including £4000 for working expenses. This would mean a rate to the city of about 3s. 4d. in the pound. As to what the cost of an entirely new supply from the mountains would be, no one had formed any reliable estimate. But with regard to obtaining water from wells, he alluded to the injurious effects caused by deposits in the pipes, and said that if Chester got the Vyrnwy water, they would not have any better supply than that of Liverpool, which, according to one authority, was rich in typhoid germs, while the much-decried filtered river water, which had long been supposed to be the bane of London, was superior to it. The report was adopted; and the dividends recommended were declared.

After providing for all expenditure, the Cleveland Water Company have a disposable balance of £4255 on the past half-year's working, which has enabled the declaration of a dividend at the rate of 8½ per cent. per annum on the original and "A" shares and £5 19s. per cent. on the "B" shares, the setting aside of £125 for contingencies, and the carrying forward of £1240.

At the recent annual meeting of the Cromer Water Company, the Directors presented a report which showed that the revenue for the year was £2297, and the expenditure £709; the former figure being an increase of £307, and the latter of £101 on those for the preceding twelve months. The profit on the year's working carried to the profit and loss account was £1588. This, added to the balance brought from last year, made the total of that account £1670. After the payment of interest on the debenture stock, there remained a balance of £1445. Deducting from this the sum of £200, which the Directors had applied in further writing down the account for meters and services, they recommended that the remaining balance—£1245—should be dealt with as follows: To be transferred to the reserve, £200; dividend at 5½ per cent. per annum, free of income-tax, £888; and balance carried forward, £157. The estimated

quantity of water pumped during the year was 33,671,600 gallons. The report was adopted.

Continued progress marks the business of the East Worcestershire Water Company. During the past half year 297 additional services have been connected; making the total 4972, exclusive of Droitwich and Rednal. There has been a considerable increase in the quantity of water pumped; the daily average having been 632,900 gallons. The accounts show a further increase in water-rental; and there has also been an additional amount brought to credit through increased activity in the fittings department. The net profit is £1687, against £1416 the previous half year; so that the policy of paying an increased dividend has been fully justified. Adding the amount brought forward from the last account, £803, there is now a disposable balance amounting to £2491, which it is proposed to appropriate as follows: By paying a dividend at the rate of 3½ per sent. per annum, £1079; adding £635 to the depreciation reserve fund; and carrying forward £777.

The Directors of the South Staffordshire Water Company, in the report they will present at the half-yearly meeting on the 25th inst., state that in the six months ending June 30 the number of houses laid on was 1828; making the total supplied 96,681. The gross amount of water-rates was £48,557, against £47,593 in the corresponding period of the previous year. After providing for interest on the debenture and preference stocks, the amount remaining for division (including £4362 brought forward) is £23,024; and the Directors recommend the declaration of a dividend for the half year on the ordinary stock at the rate of 6 per cent. per annum, free of income-tax. The amount of this dividend being £17,850, there will remain £5174 to the credit of the next half year. The report of the Engineer (Mr. H. Ashton Hill) as to the condition of the Company's works is that they are in substantial order and repair.

Mr. A. C. Willyams, who presided at the recent half-yearly meeting of the Truro Water Company, congratulated the shareholders on the steady progress of the undertaking. The overtures by the Corporation for the purchase of the property had been under the serious consideration of the Directors, who would not recommend the raising of any unnecessary objection to an arrangement with the Council. At the same time, it must be fairly understood that they would expect such a price as would give them an increase on the dividend they were now receiving, because they were justified in looking forward to a very considerable augmentation. The report of the Directors was adopted; and it was decided to pay a dividend of 5 per cent., to transfer £200 to the capital account, and carry forward a balance of £20. The Engineer (Mr. N. Trestrail) said the consumption of water was at present on the increase, while the pumping charges had been reduced from £14 13s. 2d. per million gallons in 1885, to £3 8s. 9d. during the first half of the present year. He believed the Company would be in a position to pay a dividend of 10 per cent. in the near future.

The report of the Yeadon Water Company for the six months ended June 30 shows that the expenditure on capital account in that period was £66; making the total outlay on the works up to the present £55,369. The receipts on revenue account amounted to £1552, and the expenses to £540; leaving a balance of £1012. This, added to £262 from last half-year's account, makes a total of £1274 available for distribution. The Directors recommend a dividend at the rate of £5 10s. per cent. per annum on the original capital, and £3 17s. per cent. per annum on the "B" stock, 1889, which will leave £265 to be carried forward. The reserve fund amounts to £250.

The half-yearly meeting of the York Water Company was held on the 4th inst. at the Merchants' Hall, York—Alderman Rymer, Vice-Chairman, presiding. The Chairman moved the adoption of the half-yearly report, in which the payment of the usual dividend of 5s. per share without deduction for income-tax, was recommended; and it was carried. The Chairman then moved the declaration of the dividend, and said that since the report was issued it had come to the knowledge of the Directors that serious irregularities had been committed by the Secretary (Mr. J. W. Watson). The Official Auditor of the Company (Mr. G. O. Taylor) called the Directors' attention to certain facts, and inquiries were made which brought the irregularities to light. The Directors thereupon suspended the Secretary; and instructed Mr. Taylor to make a thorough examination of the books of the Company. The dividend recommended was based upon the balance-sheet for the past half year; and the Directors anticipated that the bond of the Guarantee Society, coupled with a special guarantee fund which they were themselves providing, would meet the deficiency in the dividend for the current half year which might result from these irregularities. The Board had the most absolute confidence in the Secretary, who had been in the service of the Company for about 30 years, and in many respects had rendered zealous and efficient services. The motion was carried.

BROMLEY GAS CONSUMERS' COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, at the White Hart Hotel, Bromley—Mr. Alexander Dickson in the chair.

The Secretary read the notice convening the meeting; and the report and accounts, of which an epitome appeared in last week's issue, were taken as read.

The Chairman, in moving their adoption, remarked that a warm and bright winter was by no means a great boon to gas companies, though it might be to their consumers. The climatic conditions which prevailed during the past half year had a distinct impression upon the consumption of gas, and had considerably retarded it. But, notwithstanding, the make of gas had increased during the six months by about 6 million cubic feet, which, he thought, would be considered very fair. Those shareholders who had looked somewhat critically into the accounts would possibly have observed that the whole of this increase had not been sold, and that about 1¼ to 1½ millions of it appeared in the unaccounted-for gas. He was asked a question regarding the unaccounted-for gas at the last meeting; and said he thought it would be well to explain the matter at this point. Of course, everyone would desire that there was no such thing as unaccounted-for gas; but he did not think a gas engineer had yet been born who was able to avoid it. It partly arose from the difference in the temperature of the gas at the point of registration at the gas-works and the temperature at the consumers' meters after the passage of the gas for some distance through the cool mains. Another portion of it might be due to the variation in the quantity of gas in the holders at the end of the half year. For example, supposing at the close of one half year the holders were absolutely empty, and at the end of the next half year they were full, it was obvious that, during the latter half year, they would have made not only the gas sold, but what remained in the holders. The gas in the holders did not come into the money account; and it was not reckoned as stock. It would therefore be understood that there must, from time to time, necessarily be variations in the volume of unaccounted-for gas. Following up the accounts, it would be seen that they had an increased revenue from gas and meter rentals combined of about £729. Then sulphate of ammonia had produced an additional £137 by reason of their having sold a larger quantity at a somewhat better price. There were other small items of increase, which gave them a total advantage on that side of the account of £927, which, however, was reduced by £266 in consequence of the lower value of the tar sold. The net increase in the revenue was £648. Turning to the expenditure, he said there was an increase of £349 in the cost of coal, which was a question of price, and not of quantity. Wages had risen by £145; and in other items they had increases amounting to £109. On the other hand, they had savings to the extent of £103, so that the increase in the total expenditure was £501. Then they had taken advantage of the fact of their having a balance of about £554 after paying the dividends for the half year to write off £240 for depreciation of retorts, which the Directors thought was an expedient thing to do now that they had the funds well in hand. This left them with a net surplus of £313 above the amount required to pay the dividend at the same rate as hitherto, and upon a slightly increased capital. Seeing that the largest Gas Company in the world had had, during the past half year, to raise the price of gas 2d. per 1000 cubic feet in order to maintain their dividend, he thought the shareholders would consider the result in their own case very satisfactory. They had earned their dividend without advancing the price of gas, and had a surplus in addition.

The Deputy-Chairman (Mr. Bertram H. Latter) seconded the motion, which was unanimously carried.

On the proposition of the Chairman, seconded by Mr. Latter, a dividend was declared at the rate of 11½ per cent. per annum on the ordinary 10 per cent. shares and 8½ per cent. on the ordinary 7 per cent. shares.

This concluded the business.

WINDING UP OF THE COWES GAS COMPANY.

A Special General Meeting of the Cowes Gas Company was held on Monday last week to appoint an Auditor of the accounts for the period ending July 30, 1898, and to vote the Directors a sum by way of remuneration for their services and as compensation for loss of office; the undertaking having, as our readers are aware, been acquired by the District Council on the 1st of January last. The price paid, in accordance with the Umpire's award, was £52,150, in addition to which the Council paid £2409 as the agreed costs of the Company's Act, and £350 for stock-in-trade, stores, &c. The amount to be disposed of was £56,856. The first distribution of assets was at the rate of £20 for each £10 of original capital stock (£13,430); the second, at the rate of £10—absorbing together £40,290. After payment of liabilities, there was a sum of £7374 4s. 6d. to be carried to the general balance-sheet. The statement of accounts presented was accepted by the proprietors, who appointed Mr. A. W. Oke as Auditor, at a fee of £2 2s., and voted £825 to the Directors. The balance of £6547 2s. 6d. will permit of a further payment of £4 17s. 6d. per £10 of stock; making a total of £34 17s. 6d. per share. The highest price the shares ever fetched when the Company were paying 10 per cent. was £20. During recent years, however, the highest dividend has been 8½ per cent.; and the highest selling price of the shares £15 12s. 6d. The proprietors are therefore getting a very handsome return.

THE PROPOSED RESIDUALS WORKS OF THE HOLYHEAD AND NORTH WALES GAS AND WATER CORPORATION.

In the report of the meeting of the above-named Company which appeared in the "Journal" for the 19th ult., it was stated that the Directors had secured, near Llandudno Junction, a site for treating their tar and ammoniacal liquor, and that the necessary works were in course of construction. The project has given rise to much opposition in the neighbourhood, notwithstanding that the Company's Manager (Mr. G. E. Saville) has given abundant assurance that no nuisance would be caused. Some time ago a representative meeting was held at Conway to protest against the erection of such a building in the vicinity, it being alleged that it would be injurious to the district as a holiday resort. Strong resolutions were passed, calling upon the Rural District Council to reject the passing of the plans; while another was adopted, having for its object the appointment of a Joint Committee of the respective Local Authorities with the view to aiding financially the action of the Council in any possible lawsuit which might be brought against them. The Committee has been appointed; but, as we understand, no meeting has yet been held. The Council have, however, expressed an opinion upon the subject; for at their meeting last Friday it was decided, without any discussion, not to pass the plans submitted by the Company for their approval, and, further, not to give any reason for their action.

Sedgley District Council Gas Profits.—The annual report of the Gas Committee of the Sedgley District Council states that the balance of profit on the year's working amounts to £1006. Of this £600 has been appropriated for capital and interest, £200 for the benefit of the ratepayers, and £200 for meters and fittings. The Chairman of the Gas Committee attributes, in large measure, this satisfactory state of affairs to the interest and energy evinced in the undertaking by the officials.

THE MANAGEMENT OF THE SOUTHPORT GAS-WORKS.

Resignation of the Chairman of the Gas Committee.

The annual report of the Gas Engineer of the Southport Corporation (Mr. John Booth), which was noticed in the "JOURNAL" for the 19th ult., was presented with the minutes of the Gas Committee to the Town Council last Tuesday; and, as the conversation which took place at the previous meeting threatened would be the case (see *ante*, p. 163), the discussion took a lively turn, and ended in the Chairman of the Committee (Mr. Dimond) resigning his position.

Mr. DIMOND, in proposing the adoption of the minutes of the Gas Committee, said he believed the gas-works were above the average in every respect. During the last three years, the Committee had done as much as possible to improve them in every shape and form; and to his mind they were model works. As to the profits, on which he expected there would be some discussion, he would take the average of eight years—*i.e.*, the last ten years with the exception of two years when the price of gas was raised. The gross profit for the eight years was £103,867—an average of £12,983; and last year it was £15,154. The net profit in the eight years was £51,403—an average of £6424; while last year it was £6716—nearly £300 above the average. Then on mains and services they had spent £1642 more out of revenue than in the previous year. They had lost the rent of meters, £841; and, in addition, had paid £1088 more for interest and sinking fund. For the lighting of the public lamps £1821 was paid; and the gas was supplied at net cost. Altogether they were paying £5463 a year, which had nothing to do with gas production. Then there was £7862 charged to capital account for the Eastbank Street site. They were charged on capital account £1622 for sewer ventilating-lamps, which had been purchased by the Health Committee, but had been tacked on to the Gas Committee. Gas-cookers had cost £6573, which was being put to a suspense account. Then they had cottage property standing at £4650; and altogether they had a total of £23,716, which had no more to do with gas making than the "man in the moon." From January to March, they sold 5½ million cubic feet of gas less than in the same period last year. Those were reasons why they did not make as much profit as before. As to the yield of gas per ton of coal carbonized, he found that they beat Manchester, where the make was 9960 feet of 20-candle power; while their own was 10,066 feet of 20¾-candle power. If experts were called in, the Council would have as many opinions as they had individuals. Widnes was a place which was often quoted. There they made gas out of slack; but the Engineer (Mr. Isaac Carr) would not tell anyone how he did it. The charge there was 1s. 4d. per 1000 cubic feet; and Mr. Carr would not be satisfied until he got it down to 1s. But that was the only case of the kind in England. He would give one comparison. Bury, with a similar make as Southport, reported a loss of £1606 last year; but next year's profits were estimated at £3000—less than half the profit made in Southport. During the present year, the Committee had been a little more successful. In the past four months, they had delivered 8,609,000 cubic feet more than in the same period of last year; so that they were on the up-grade. Their works were well cared for; and the Committee were fully alive to their duties. They had enlarged the gas-mains; and Birkdale had now obtained power to lay new mains, so that they expected they would get numbers of new customers. He should like to say that, from the rebate they allowed the Birkdale Authority, they must have paid for the mains many times over; and yet they were giving them nearly £2000 a year to help them to reduce their rates.

Mr. DEWHURST seconded the motion.

Dr. WEAVER was sorry he could not agree with the Chairman's remark that the year's working was satisfactory, and that was why he had given notice of his motion for the appointment of an expert. The profits were over £2000 less than they were a year ago. If that was satisfactory, and the same rate went on, they would soon have no profit at all. They had increased the capital account, and also the cost of manufacture. There might be explanations; but he felt it his duty to take the line he did. The make of gas per ton of coal was put down at a little above 10,000 cubic feet per ton—a reduction of about 600 feet, which made a difference in the year of 20 million cubic feet.

Mr. DIMOND: Last year's make was 9631 cubic feet.

Dr. WEAVER said then he would like to ask why they had not made as much last year as this. They had been told that the leakage of gas was through the tops of the retorts; and if this were so, it was a serious reflection on the management that it was not found out in time. As to the comparison with Widnes, he did not wish to push that too far, as the Manager there must be a sort of genius in gas making. There was, however, a great difference between 1s. 4d. and 3s. Blackpool produced 19-candle power gas and sold it at 2s. 4d., making a profit of £10,000; Manchester produced 19-candle gas and sold it at 2s. 3d.; St. Helens made 18¾-candle gas, and sold it at 2s. 4d. As to the return on their capital, the interest was 2·8 per cent.; at Oldham, it was 7½ per cent., the gas selling at 2s. and 2s. 3d. per 1000 feet; at Blackpool, it was 9 per cent., the price being 2s. 4d.; at Nottingham, the profit was 7½ per cent., and the price was 2s. and 2s. 6d. So that there was a great deal of difference between the amount of profit in Southport and the capital involved. He did not think the policy of the Committee was a wise one, seeing that all their profit came from lighting gas. Cooking gas was sold at cost price; so that, if lighting gas was further affected by the electricity undertaking, they would lose revenue more and more. Everything should be done to cheapen the cost of the gas. An advance of a penny on cooking gas would give them a profit. Therefore he thought they ought to have an expert, and see that they were receiving a good return to relieve the rates. It would be a simple matter to get 3d. or 4d. more per 1000 cubic feet, and then they could get back to a 3s. rate. He had no personal feeling whatever in the matter; and he made these criticisms simply as a matter of duty.

Mr. HESFORD regretted that he could not agree that the report was satisfactory. He thoroughly believed that every member of the Committee had an earnest desire to make the department a good one. The material used had been the same for the past three years. Two years ago the production of gas was very small indeed; the average amount that passed through the consumers' meters for every ton of material used being 8523 feet. The succeeding year 10,150 cubic feet were produced from exactly the same kind of material; and this year the average amount passing through the consumers' meters was 9800 feet—a difference of 350 feet. The amount of material used was 1400 tons more this year than last; and the explanation was that they were working machinery in a defective condition. Comparing their works with others, it was absurd to say that they were doing well. As to the sale of residuals, the results were not equal to those of the best works. He could not understand the Engineer or the Committee saying the management was satisfactory.

Mr. TRAVIS moved, as an amendment, that the report be adopted, with the exception of the paragraph which stated that the results of the working were satisfactory. He could not agree that electric lighting had caused the reduction in the gas consumed. As to the differences in the revenue from residuals, they were so slight as not to be worth mentioning. In regard to the Eastbank Street site, the Committee were receiving rent for it; and as to the ventilating-lamps, they were charged to the Highway Committee. If Southport produced gas at the same price as Blackpool, they would have had £12,000 more in hand than they had; and there would have been no necessity to raise the rates. If Blackpool could do that, why could not Southport. [Mr. DIMOND: You know as well as anyone.] At Lancaster they sold 20-candle power gas for 2s. 3½d., or nearly 1d. per 1000 feet less than it cost Southport to make it; and yet every advantage he could think of was in favour of Southport. Apart from capital charges, the cost of manufacture was 1s. 10½d. in Southport and 1s. 4½d. in Lancaster. If they could make gas at the same price as Lancaster, leaving out the capital account, they would be £9000 better off than they were.

Alderman FISHER said those who had spoken were well aware that they could not compare Southport with any of the places named. When they quoted from the report, they ought to quote all the facts. Mr. Travis did not show that there was a decrease of 16 million cubic feet in the gas supplied on which they made a profit. It was true the Committee had delivered more gas; but that was because there had been an increase of 18 millions in the gas on which they made no profit. He considered they had no business to employ capital in a commercial direction without making a profit. No one knew better than Mr. Hesford and Mr. Travis that the substitution of the electric light for gas had been one of the causes of the reduction of the profit on the gas-works; but there had not been the slightest reduction of capital in consequence. There had rather been a considerable increase in the capital account. If the Committee were in any way at fault in regard to the production of gas per ton or in the price charged, there was a very simple duty before the Council, and that was to dismiss the Committee and appoint another. He contended that the gas undertaking was managed as cheaply and efficiently as any in the kingdom.

The DEPUTY-MAYOR (Mr. J. Boocock) could not see that there was any want of confidence being shown to the Committee in asking them if they could not work on cheaper lines; and, if they had not the requisite knowledge, to call in such authorities as would enable them to achieve the desired result.

Alderman GRIFFITHS said there had been a strong attempt to depreciate the work of the Gas Department. A year ago the profit was £9000; and last year it was £6716. They had lost revenue from the meter-rents; they had sold 16 million cubic feet of gas without profit; and they had spent more out of revenue on the maintenance of their mains. Taking these things into consideration, they reached about the same figures as in the preceding year. The gentlemen who had criticized the Committee's work did not state the facts; and he thought it was abominable. Manchester was in its present position because of the enormous profits in years gone by, in consequence of which their capital was small. He thought it would be a good policy to encourage the use of gas for lighting purposes rather than electricity. If the Gas Committee of former days had not left their works in Eastbank Street, in the very midst of the population, they would now be able to make gas as cheaply as Blackpool. As to Widnes, he did not think they could compare such a town with Southport, with their miles of streets, the semi-detached houses, and separate mains to each.

Mr. HOLLAND seconded the amendment. Both Aldermen Fisher and Griffiths were excellent debaters, and on very many subjects had been known to shine; but on this matter they had done just the contrary. No one knew better than the gentlemen in question that the gas undertaking had been and was badly managed; and the conduct of some of the men had been unworthy of the trust and confidence of the people of Southport. Yet these were the gentlemen who defended the position.

Alderman FISHER entered his protest against this language.

Mr. HOLLAND: You can enter a dozen protests if you like.

Alderman FISHER said he had conscientiously discharged his duties; and he believed the other members had. Why Mr. Holland said they knew the works had been badly managed, and yet remained on the Committee, he did not know.

Mr. HOLLAND said it had been a case of trusting the Gas Committee too long; and he was not going to trust them any longer.

Mr. THRELFALL said he had every confidence in the Gas Committee; but the members of it were not gas experts. He was not going to impeach them; but how was it that for the last fifteen years there had been dissatisfaction at the gas management? All the criticism of the Gas Manager had been taken by the Gas Committee, who had saddled themselves with the responsibility. The gas management was like Tennyson's brook: Committees might come, Committees might go, but the Manager went on for ever. It seemed to him that the position was one which called for the engagement of an expert. He believed if the estate was properly managed, gas could be produced at a cheaper rate, more gas would be produced, more men would be employed, and wages would be better. The discussion came to this—that, as there was not a man on the Committee who knew the ins and outs of gas making, a very strong case had been made out for an expert's opinion being obtained.

Mr. DIMOND said he did not believe any member of the Gas Committee thought he had been attacked. He was not going to say anything about the Manager. They had had him for eighteen years; because they knew it was better to "bear the ills we have than fly to others that we know not of." He alluded to the differences of opinion among gas managers and experts, and expressed the belief that in the near future the gas undertaking would render a better account of itself than in the past.

On the vote being taken, fourteen members declared in favour of the amendment, and eight against it.

Mr. Dimond (excitedly): Mr. Deputy-Mayor, I beg leave to resign the chairmanship of the Gas Committee as a protest against such an unfair proceeding.

The minutes were then put, and carried, with one dissentient.

Mr. Hesford, on behalf of Dr. Weaver, moved—"That a first-class expert be engaged to report upon the gas estate, with instructions to recommend to this Council any improvements which, in his opinion, would be likely to result in an increased profit." He said that, although he was prepared to support the spirit of the resolution, he should not do it without at least a formal instruction being given as to what the expert had to do. He wanted an expert, having full regard to the capital expended, to study and give his opinion upon the cost of making gas, which now stood at 1s. 11·44d. per 1000 cubic feet. He also wanted an opinion upon the question of residuals. The only policy of the Gas Committee for years had been that of marking time; and an expert might be able to give them some light upon essential matters.

Mr. Holland seconded, but took exception to the limitations of the expert's work.

Mr. Hesford said he would make it an open resolution.

Alderman Griffiths looked upon the resolution as a vote of censure. He thought the proper course would have been to send the resolution to the Gas Committee, so that they could report upon it, and not pass it in the Council.

Mr. Hulme moved, as an amendment, that the matter be referred to the Gas Committee.

Alderman Sir George Pilkington seconded this.

Alderman Rimmer said the whole discussion had been against the Gas Manager; and those who objected should have had the courage of their conviction, and brought a resolution that embodied something of this kind: "That the Gas Manager should be dismissed." That was what it all meant. He did not know that he should ever again make a speech in that Council Chamber; the matter had not been fair from beginning to end. The gentlemen who had taken a large part in the discussion were interested in another Committee, who had produced the results before them. They could not have electric light for the town, and have the same profit from the gas-works. Whether there was any fault with the Gas Manager he was not there to say. The arguments had not been against the Manager, but against the Committee. They had been on their trial, and had been treated in a shameful and unmanly way.

Alderman Rimmer here left the chamber; and Mr. Threlfall took exception to his "throwing stones" and then leaving the room.

The amendment was carried, and the matter referred to the Gas Committee to report upon.

THE PLYMOUTH CORPORATION AND THE GAS COMPANY.

The Opposition to the Company's Bill.

The report of the Parliamentary Committee of the Plymouth Town Council on the opposition to the Bill of the Plymouth and Stonehouse Gas Company, which was published in the "Journal" last week, was presented to the Town Council on the 8th inst.

Alderman C. H. Radford, the Chairman of the Committee, in moving the adoption of the report, claimed that two out of the three points in the Corporation's petition were obtained without going to the expense of engaging Counsel; and that must be regarded as satisfactory. He proceeded to reply to the remarks of the Chairman and Deputy-Chairman at the last annual meeting of the Gas Company (see "Journal" for June 28, p. 1582), on the action of the Corporation, and claimed that, in the interests of the ratepayers, the Parliamentary Committee should have the power they exercise of watching proceedings in Parliament. Mr. Henderson, the Chairman, said that the Corporation opposed the Gas Company "on every possible occasion." The first time opposition was raised to the Company was in 1879; but from 1879 to 1894 the Company did not go to Parliament, and the Corporation had no opportunity of opposing them. The opposition in 1894 was justified by results, for they got considerable concessions on that occasion. The opposition this year was only for the third time in twenty years; and therefore the strong remark as to opposition "on every possible occasion" was misleading, and ought not to have been used in that sense. Mr. Henderson complained that the Company had to take steps to meet the opposition; and though it was ultimately withdrawn, an expenditure of about £1000 was incurred by the Company. This was a most unjustifiable statement. The object of the opposition was set out in the petition, and was more in the nature of a friendly settlement; and he submitted it was untrue that the Company, by reason of the opposition, had had to incur an expenditure of £1000. He believed the Company's expenditure by reason of the opposition was not more than a few shillings or a few pounds. Another reckless statement of the Chairman of the Company was that in 1894 the Corporation, by their opposition, only got an increase of from 14 candles to 15 candles in illuminating power, while the Company had been supplying 15-candle gas before, as was shown by the tests of the Borough Analyst. The fact was, however, that the Corporation's apparatus for testing the gas was not in existence until some months after their opposition to the Bill; and though it was possible the Borough Analyst did make some tests, they were made at the works, and after notice. Mr. J. A. Bellamy, the Deputy-Chairman of the Company, made more serious statements on the same occasion; and he regretted that Mr. Bellamy was not at the Council meeting, in order that he might explain and apologize for some of the things he said at the meeting of the Company. Mr. Bellamy said "the Corporation of Plymouth had apparently considered it to be its duty to oppose any Bill brought forward by the Company." He had apparently forgotten that in 1894 he was himself a party to the opposition then brought against the Gas Company's Bill. On that occasion, when the Council proposed to take power to purchase the gas undertaking, Mr. Bellamy made a speech in which he said that, while he quite agreed that the lighting of the town should be in the hands of the Corporation, the light of the future was electricity. They all agreed, he said, that the gas supply had been well managed by the Company; and to transfer it at a time when it was probably about to be superseded by electricity was most inopportune. That was a speech which he thought Deputy-Chairman Bellamy would repudiate to-day. The change he had made from the position of Councillor to that of Deputy-Chairman of the Company seemed to have altered all those sound progressive ideas which were once those of Mr. Bellamy. It was neither fair nor proper to say that the Council wished to thwart the Company. They were all gas consumers, and they wished the Company success in regard to the welfare of the town; but they also wished the gas undertaking was in their own hands, and Mr. Bellamy as Chairman of the Lighting Committee. Mr. Bellamy further said at the Company's meeting that they had nothing to fear from competition with electricity, "assuming that the Corporation debited each branch of its business in a proper and honest manner." He (Alderman Radford) did not think any member of the Corporation ought to insinuate that the Council did not keep their accounts in a "proper and honest manner;" and Mr. Bellamy ought to either substantiate his charge or withdraw it.

Alderman Shelly, who is the Solicitor to the Gas Company, said that while two of the three objects aimed at in the Corporation's petition had been attained, it must not be forgotten that the Company were ready to agree to, and offered, through him, to concede them from the beginning. It was said that the Company omitted to incorporate in the Bill provisions which would preserve the rights of the public as to a common nuisance; but this was already in a previous Act. What the Company objected to was a different law being made for Plymouth to that which obtained in London, Brighton, and other towns; and this point was dropped by the Corporation. The Company were ready from the beginning to accept any fair and proper terms, and were always ready to give that which the Town Council had obtained. It was, however, a fact that he did not know until after he had left Plymouth for London that no appearance would be made on the petition. Therefore they had to engage Counsel and have witnesses in attendance.

The Town Clerk (Mr. J. H. Ellis) contended that, by reason of the petition, the Company were not put to the expense of a thousand shillings. But for one little point, the petition would have been withdrawn.

The Mayor (Alderman J. T. Bond) said there was a petition against the Bill representing between 50 and 60 owners of small property in the neighbourhood of the gas-works, who, because they had not money enough to carry it on, had to suffer annoyance. This showed how vital it was in the interests of the poorer people, that a huge and wealthy Company trading in the borough should be carefully, closely, and critically watched by the Corporation.

The report was then adopted.

Mr. J. A. Bellamy, the Deputy-Chairman of the Gas Company, has since written to the local papers explaining that a business engagement kept him away from the meeting of the Council. In a long reply to Alderman Radford, he says that that gentleman is misinformed in the statement that the first time opposition was raised to the Company was in 1879. "The Gas Company has been to Parliament four times—1855, 1879, 1894, and 1898; and on all four occasions the Corporation have opposed. The opposition of 1894 was particularly costly to the Company, and therefore to the consumers. It must have cost the ratepayers—nearly all of them gas consumers—a considerable sum of money. The only apparent advantage obtained on behalf of the consumers was the statutory obligation imposed on the Company was to supply gas of 15-candle-power, which it had been doing for years previously without such statutory obligation. I am of opinion that on that occasion at least 'the game was not worth the candle.' Mr. Radford charges me with having been a party to the opposition of 1894, because I was in the Council at the time and raised no protest. Further on, however, he quotes from some remarks I made, from which it is evident I did object to the opposition being offered to the Company's Bill of 1894." Mr. Bellamy says he stands by his criticism of the action of the Parliamentary Committee as to its eagerness to oppose Parliamentary Bills—at considerable expense—without making proper inquiries into the subject, and without making serious efforts to obtain reasonable conditions by friendly discussion before taking up a fighting attitude. With reference to the taunt that he made a speech in 1894 which is inconsistent with his remarks at the meeting of the Gas Company, Mr. Bellamy says: "In 1894, I, together with most of the other members of the Council, understood that the very inefficient lighting of the town was due to the parsimony of the Gas Company. It is only within the last twelve months that I and others have become aware that the number, pattern, and candle power of the public lamps were fixed years ago by the Corporation, and that the Gas Company had been always ready to co-operate in bringing about an improvement in the public lighting. In 1894, the recent system of incandescent gas lighting for streets was in its infancy, and it appeared to me that the electric light would supplant gas lighting for such purposes very soon. I considered it would be folly to buy up the Gas Company's property under such circumstances. I was therefore in favour of the town acquiring powers to supply the electric light; and I still consider the town, and not the Gas Company, should have these powers. But since then public gas lighting has made immense strides; and at the time the Corporation decided to erect the electrical works there were in existence gas-lighting schemes giving the same illuminating power as the electric light, at far less cost." As to the question of the accounts of the Electric Light Department, Mr. Bellamy explains that the electricity works have to supply current for traction for the tramways as well as for lighting, and says that if each of these departments is debited with its own proper capital, maintenance, depreciation, &c., the Gas Company need not fear the competition. He expresses most cordial agreement with the remark of the Mayor as to the necessity of the Company being critically watched by the Corporation; but he adds: "There is a vast difference, however, between this and factious and expensive opposition before Parliament, without any advantage whatever to the public." As to the allegation of nuisance, Mr. Bellamy points out that, after the recent exhaustive inquiry, the Official Referee decided that there was no nuisance from the gas-works. In conclusion, Mr. Bellamy points out that, under the sliding-scale, the interests of the gas consumers are the interests of the Gas Company, and that though it might be possible to harass the Company, the consumers would be the heaviest sufferers.

Alderman Radford has written to Mr. Bellamy explaining that he did not mean to say that that gentleman would repudiate what he said in 1894 in the sense of lying about it, but that he would now desire to repudiate the sentiments which he expressed in 1894.

In commenting upon the discussion in the Council, the "Western Morning News" says: "What the Gas Company complain of, and what

the ratepayer may equally resent, is that money is wasted, as in the case of this year's Bill, on opposition which is perfectly useless and futile, and is known by the Corporation to be useless and futile. In 1894 a definite issue was raised. The Corporation sought power to buy the gas-works, and failed to get it. This year it put forward as one of the chief grounds of its opposition an absurd claim to the right to supply gas within the added district of the borough—in Laira and Pennycross—where, if it had the power, it could not by any possibility exercise it. It is true that this demand was withdrawn after a time; but, meanwhile, the money of the ratepayers and of the Gas Company (whether a thousand pounds or a thousand shillings does not affect the principle) was frittered away in useless costs. The Corporation gained nothing which it could not have gained by friendly conference with the Gas Company. Many people will be inclined to think there would have been no opposition to the Gas Company's Bill, or indeed, to the Bill for the extension of the boundary of Devonport, if the temptation to enjoy what in Devonport they call a 'picnic' to London were not too strong to be resisted. Mr. Radford did not allude to the pregnant remarks of the Chairman of the Gas Company on the rights of Corporations to take action in opposition to Bills in Parliament without first obtaining the consent of the ratepayers. On the contrary, he claimed for the Parliamentary Committee 'the power they exercise of watching proceedings in Parliament.' But, surely, if the Swansea case means anything at all, the Parliamentary Committee have no such right; and the Council cannot confer it upon them."

GAS AND ELECTRIC LIGHTING AT LEIGH.

A Local Government Board inquiry was held at Leigh last Tuesday, by Mr. W. O. E. Meade-King, respecting an application by the District Council for sanction to borrow £25,000 for gas-works extensions, and £10,500 for electric lighting purposes. Mr. P. Thomas, the Clerk to the Council, explained that the old gas-works in Leigh were purchased in 1874, from the Leigh and District Gas Company, for £48,000, by the West Leigh, Pennington, and Bedford Local Boards, which were then amalgamated into the Leigh Local Board. Up to the present time, £100,000 had been borrowed by the Council for the gas-works; but an additional £25,000 was now required owing to the great increase in population and manufactories during the last few years. In March, 1888, the annual output of gas amounted to 54,544,000 cubic feet, and the number of consumers was 1820; while for the year ended March 31, 1898, the output was 110,152,000 cubic feet, and the consumers numbered 4480—an increase of 101 per cent. At present the maximum make of gas was 607,000 cubic feet a day; but next winter it was estimated the consumption would be 700,000 feet. In 1893, 98 new 10-feet retorts were erected at a cost of £6400; but experience had since shown that it was better that the length of the retorts should be from 15 to 20 feet. It was therefore proposed to replace these retorts by 42 others 20 feet long. By doing so, it was estimated that the cost of labour per ton would be reduced from 2s. 8d. to 1s. 4d.; and thus a saving would be effected of about £800 per annum. In regard to electric lighting, it was proposed to erect the works on the gas-works land; and they would save the cost of boilers and chimney stacks by using those for the gas-works extensions. They intended to construct sufficient plant to supply electrical energy for five years; and from a canvass taken in the district, they anticipated making the electric works a paying concern even during the first year of their existence.

THE FALMOUTH CORPORATION AND THE GAS AND WATER WORKS.

The Purchase Scheme Revived.

A Meeting of the Falmouth Town Council was held on Thursday to receive a report from the Gas and Water Purchase Committee, who recommended that a statutory meeting of the Council be called forthwith to consider and decide as to the expediency of promoting in the next session of Parliament, a Bill to enable the Corporation to purchase the undertaking of the Falmouth Gas Company, under the terms of sections 69 and 70 of the Falmouth Gas Act, and, either by agreement or otherwise, to purchase the undertaking of the Falmouth Water-Works Company. The advantages which would accrue from the purchase of the two undertakings were that the ratepayers or their representatives would have control over such important factors in the well-being and comfort of the community, and possess property constantly increasing in value as the community increased. The Corporation at the passing of the Falmouth Gas Act obtained the insertion of a clause empowering them to purchase the undertaking either by agreement or arbitration. In taking advantage of this clause, the Committee point out that the cost of obtaining an opposed Bill in Parliament and of the 10 per cent. usually added for compulsory sale will be avoided, and that next session is the last available for such action, as, after procuring parliamentary powers for obtaining and expending the money, six months' notice of the intention to purchase previous to July 4, 1900, has to be given. With reference to the purchase of the water-works, the Committee referred to the importance of a pure supply of water for a town ranking as a health resort, and expressed the opinion that the Water Company had not done their best to maintain the supply, and to prevent impurities getting into the water. The report was adopted—two members voting against the motion, and one remaining neutral.

EXPLOSIONS IN ELECTRIC LIGHT CONDUITS.

A serious explosion, by which great damage was done, occurred last Wednesday night in one of the main thoroughfares (Bottom-o'-th'-Moor) of Oldham. An employee of the Corporation Electric Light Department went to one of the large arc electric lamps to turn off the light; the cock used for this object being in an aperture at the base of the pillar. He had no sooner turned the cock than a terrific explosion occurred, which was followed by a rumbling noise, and the tearing up of the foot pavement for a distance of about 40 yards. The stone flags were lifted a foot high in places, many of them being smashed into small pieces; and pedestrians on the pavement were thrown to the ground. As early as possible, Corporation workmen were set to work to effect repairs; and during the following morning they discovered a leakage in the gas-mains. It is supposed that, in switching off the current to the lamp mentioned, a spark was emitted, with the result that the gas which had accumulated in the conduit exploded. The Electric Department are now making a change in the system in operation for laying cables. Up to the present, the wires have been insulated in a three-sided concrete conduit with flag top; but in future the cables throughout the town will all be run through iron pipes.

An explosion took place in one of the electric light conduits in the roadway in Cumberland Terrace, Regent's Park, about a quarter to one last Friday morning, bursting through the road, and extending to two other conduits, in which explosions also occurred. The iron covers of the transformer chambers, weighing about 4 cwt. each, were blown off. Fortunately, no one was injured; but several hotels were thrown into darkness, as was also the case with some of the principal streets in the district.

POLICE AND SANITARY REGULATIONS BILLS.

The Select Committee of the House of Commons on Bills containing new police and sanitary regulations have presented a special report, which is now issued as a Parliamentary Paper. The Committee give an account of their labours during the past session, and state that they have not granted powers which are in excess of, or which contravene, the general law except in cases where local evidence has been produced, and where, by such evidence, proof has been given that difficulties were experienced in the locality with which the existing law has been found unable to cope, or where it has appeared to them desirable that some powers should be granted to the locality other than those conferred by the general law. With reference to the periods for repayment of loans, the Committee have differentiated between work of a permanent and that of a temporary character; and they have endeavoured to put into practice the principle that the term for repayment shall be based upon the estimated life of the work in question, so that unfair burdens should not be thrown upon a future generation. It appears to the Committee that much unnecessary expense to the parties, and valuable time to the Committee, might be saved by the exercise of greater care in preparing Improvement Bills, in revising them before submission to the Committee in the light of the evidence to be given by the witnesses, and by a more strict regard to the model clauses and recent precedents. It also appears to the Committee to be somewhat doubtful whether in all cases sufficient care has been taken to ascertain, before incurring the expense of a Private Bill, how far the objects to which the promoters attach real importance can be attained under the general law or by means of Provisional Orders. They express their desire to strongly reiterate the suggestion previously offered for the consideration of the House, whether the time has not arrived for the inclusion in a Public Bill of many of the clauses which are so frequently introduced into Private Bills, and which have almost invariably been accepted by Parliament. It appears to the Committee that much trouble and expense might be saved if the necessity for application to Parliament for such powers by individual authorities were rendered unnecessary.

THE SUMMER MEETING OF THE INSTITUTION OF MECHANICAL ENGINEERS.

Visits to Works.

The session of the Institution of Mechanical Engineers recently concluded at Derby included visits to various industrial and municipal works in the adjoining districts, interesting not only to those concerned in purely mechanical affairs, but also to engineers dealing with the questions of gas and water supply.

At one of the meetings, reference was made to the importance of the Midland Railway Company's works; and the Mayor of Derby (Mr. F. Duesbury) acknowledged that the town owed much of its prosperity to those works. The latter, with other premises, cover an area probably of more than 200 acres; and their requirements in respect of gas, water, and sanitary arrangements are equivalent to those of a fair-sized town. Gas is produced in the works formerly used for the town supply, but acquired by the Railway Company in 1875. Since then they have been enlarged to meet increasing demands; and in 1897 upwards of 133 million cubic feet of gas were made and supplied to stations, sidings, and signals in the neighbourhood. Oil gas is also largely manufactured by the Company at Kentish Town, Leicester, Nottingham, Bradford, Birmingham, and Bristol; but one of the most complete plants is at Derby, where the Pintsch process is adopted for producing gas from shale oil. A gallon of this oil will generate about 80 cubic feet of gas having an illuminating power of 45 candles with a consumption of 5 cubic feet per hour. The gas is pumped from a holder into cylindrical steel reservoirs at a pressure of 150 lbs. per square inch, and conveyed through pipes to the passenger stations, where the carriage cylinders are charged. Upwards of 2600 vehicles are now lighted by oil gas on the Midland Railway system. The water used in the works and supplied to locomotives is pumped from the River Derwent. It possesses about 15° of hardness, and is somewhat polluted with sewage and other organic matter. It is therefore highly desirable that efficient means, both for purification and softening, should be provided. These processes are carried on in the Archbutt-Decley apparatus, erected by Messrs. Mather and Platt, of Salford. The softening process not only brings down the hardness to 4·5°, but effects considerable organic purification, and reduces the number of micro-organisms present by about 98 per cent. The capacity of the plant is fully 30,000 gallons per hour. The town of Derby is supplied with gas from two works belonging to the Derby Gas Company, which were visited. The quantity of coal carbonized in the two works amounts to 50,000 tons annually, and the production of gas is 500 million cubic feet.

The Urban District Councils of Swadlincote and Ashby-de-la-Zouch are now combined for the purpose of water supply. A Joint Committee

are in full control of the works, and have been constituted a separate Authority by the Local Government Board. Beyond supplying their own district, the newly-constituted district of Woodville is furnished with water at the rate of 10d. per 1000 gallons. The area of supply now comprises 14 square miles, including the mining and pottery district of Swadlincote, and extending from Burton-upon-Trent to the boundaries of Ashby-de-la-Zouch urban sanitary district. At Milton, eight miles distant from the service reservoir, are the boreholes and a well fed by filter tunnels at the base of the gravels resting on the red marl formation. In the immediate neighbourhood are also the newly erected pumping-station and purifying plant. The general hardness of the water is from 22° to 23°; and it also contains carbonate of iron in a considerable proportion which is oxidized and precipitated on exposure to light and air. In its natural state the water is unsuitable for general use, and especially so for various industrial purposes. It was therefore decided that the whole of the water pumped should be treated by the Archbutt-Decley process to which reference has already been made; and the results obtained have entirely justified this course of action. The apparatus consists of four cast-iron tanks, each of 30,000 gallons capacity, over part of which is built the chemical treatment house. A mixing apparatus with injectors is furnished for each tank, and carbonic acid is laid on from a common producer to floating pipes in the several tanks.

No reference to the industries in the vicinity of Derby having relation to gas and water services would be complete without a mention of the Stanton Iron Company, whose works comprise the Stanton-by-Dale and Hallam Fields blast-furnaces and foundries, besides the Teversal, Pleasley, and Silver Hill Collieries, and extensive ironstone mines in the counties of Leicester, Northampton, and Lincoln. Opened more than half a century ago, the blast-furnaces and foundries have largely assisted in the industrial development of the district. The Stanton works cover about 30 acres. The foundries here include pits for making pipes from 1¼ to 24 inches in diameter, and shops for producing special castings for the pipe trade. At Hallam Fields, the works, extending over an area of 60 acres, are equipped with the most modern machinery for the manufacture of pipes up to 60 inches in diameter and 12 feet in length. All pipes are tested by hydraulic machinery before leaving the works. The three collieries are very extensive; the royalties leased amounting to 7000 acres. The coal, coke, and cannel are in high repute for gas-works. The Teversal Colliery yields an average of 1200 tons of coal daily. The Pleasley Colliery is worked at a depth of 1578 feet, and yields 1700 tons daily. It is famous for the exceptional quality of its cannel. The Silver Hill Colliery at present gives 1000 tons daily of soft coal, much in request for gas making. About 9000 men and boys are employed by the Company in their various undertakings.

A new colliery sunk by the Bolsover Colliery Company is situated at Cresswell. Here the celebrated Tophard seam, which is identical with the Barnsley bed of South Yorkshire, is reached at a depth of 1335 feet. The seam is from 5 ft. 9 in. to 6 feet thick; and the present output of coal is about 1700 tons daily, which will be increased to 3000 tons when the underground workings are completed. As regards mechanical appliances, the colliery is one of the best equipped in the country.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Good progress is being made with the taking down of the old chimney at the Edinburgh Gas-Works by Mr. W. J. Furse, of Nottingham, and his men. The most difficult and most dangerous part of the work has been accomplished, in the removal of the heavy iron and stone work which formed the top. It took about a fortnight to get in order the staging around the top. But little more than a week has elapsed since the actual work of removal began; and already nearly 15 feet have gone. There are to-day only two courses of stone left. After they are down, the brickwork will be easily handled, and the work will proceed rapidly.

The Committee of the Stirling Town Council who were in charge of the opposition to the Stirling Gas Company's Bill, having had to give way on every point of their policy, have now set themselves the task of seeking to discover for themselves glorious victories. In their report, which was laid before the Town Council on Monday, they say: "The instructions to your Committee were to oppose the Bill in the interest of Stirling ratepayers, either by securing the option under the Gas Act of purchasing the existing gas-works on equitable terms, or by getting the terms of the Bill modified so as to protect the interests of ratepayers in all time coming. Both these objects were kept fully in view by your Committee. In regard to the first, they were successful in getting from the Commons Committee the offer of a clause by which the Corporation would have been entitled to buy the gas-works without putting into operation the Burghs Gas Supply (Scotland) Act, 1876. This offer, however, was coupled with the condition that the price should be only that at which the Gas Company would be willing to sell. This condition was so manifestly unreasonable and inequitable that the Sub-Committee instructed Counsel to decline the clause as offered. In that declinature your Committee heartily concurs. In the second and alternative object, the efforts of your Committee have been crowned with most gratifying success. This will at once be seen if the terms of the Bill as deposited originally are compared with the terms of the Bill as passed by the House of Commons Committee. Taking the four essential points of (1) amount of authorized capital, (2) the amount of dividend payable, (3) the standard price of gas, and (4) the quality of gas, the difference is as follows: (1) The Gas Company proposed £59,544 of original capital; and now that is cut down to £40,000, coupled with an obligation to pay £5000 out of revenue for the repair of their dilapidated works. (2) The Gas Company asked powers to pay £5359 per annum in dividends; and now that has been cut down to £3200, coupled with an equitable sliding-scale. (3) The Gas Company wished the standard price of gas to be 4s. per 1000 cubic feet; and now that has been cut down to 3s. 4d.—the present moderate price under non-statutory conditions. (4) The Gas Company, lastly, asked the minimum quality of the gas to be fixed at 20-candle power; and now that has been raised to 25-candle power. So that the community of Stirling, without incurring any risk of loss, have now got ensured an abundant supply of excellent gaslight at a moderate price; and the Corporation has a free hand in regard to electric or any other form of

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 362.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	23½—24½	..	4 5 9
100,000	10	„	7½	Do. 7 p. c.	16—17	..	4 8 3
300,000	100	July 1	5	Australian 5 p. c. Db. .	105—107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd. . . .	6½—6¾	..	4 8 11
40,000	5	„	6	Do. New, £4 paid .	4½—5	..	4 16 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280*	+1	4 5 9
240,000	„	„	9	Do. New . . .	210—215*	..	4 3 9
50,000	„	„	5	Do. 5 p. c. Prf.. .	140—145*	+2½	3 9 0
159,375	„	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig..	268—273	..	4 4 3
218,820	„	„	8½	Do. A. Ord. Stk. .	195—200	..	4 5 0
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max. .	127—132	..	3 15 9
420,000	30	Ma . 30	11½	British	53—55	..	4 1 9
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c. .	25—27*	+1	4 5 2
75,000	10	„	8½	Do. 7 p. c. .	20—22*	+1	3 17 3
600,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9—9½	..	6 6 4
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd. . . .	30—31	..	5 6 5
100,000	10	June 10	7	Cape Town & Dis., Ltd.	15—16	..	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stk.	Apl. 15	13½	Commercial Old Stock .	315—325	..	4 3 1
200,750	„	„	10½	Do. New do. . .	252—257	..	4 1 8
200,750	„	June 10	4½	Do. 4½ p. c. Db. do.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207—212	..	5 13 2
300,000	„	„	9	Do. 7 p. c. Prf. .	197—202	..	4 9 1
51,600	Stk	Feb. 24	14	Croydon A 10 p. c. . .	310—315	..	4 8 11
168,400	„	„	11	Do. B 7 p. c. . .	255—265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125—130*	..	4 0 9
60,000	„	„	5	Do. 5 p. c. Prf. .	140—145*	+1½	3 9 0
486,090	10	July 28	11	European, Ltd. . . .	23—24	..	4 11 8
354,060	10	„	11	Do. £7 10s. paid .	16½—17½	..	4 14 4
5,923,230	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord.	28⅛—29⅛*	−⅛	4 3 7
100,000	„	„	4	Do. B, 4 p. c. max. .	120—125*	+2	3 4 0
665,000	„	„	10	Do. C, D, E, 10 p. c. Prf.	305—310*	+2	3 4 6
30,000	„	„	5	Do. F, 5 p. c. Prf. .	152—157*	+1	3 3 8
60,000	„	„	7½	Do. G, 7½ p. c. do. .	230—240*	+3½	3 2 6
1,300,000	„	„	7	Do. H, 7 p. c. max. .	192—197*	+½	3 11 1
463,000	„	„	10	Do. J, 10 p. c. Prf. .	305—310*	+2	3 4 6
476,000	„	„	6	Do. K, 6 p. c. Prf. .	182—187*	+1½	3 4 2
1,061,150	„	June 10	4	Do. 4 p. c. Db. Stk. .	131—133	..	3 0 2
294,850	„	„	4½	Do. 4½ p. c. do. .	148—153	..	2 18 10
958,000	„	„	6	Do. 6 p. c. do. .	198—203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4
3,800,000	Stk.	„	10	Imperial Continental .	210—215	..	4 13 0
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk. „	101—104*	..	3 7 4
560,000	100	Apl. 1	5	Met. of Mel- bourne 5 p. c. Db.	110—112	..	4 9 3
250,000	100	„	4½	4½ p. c. Db.	107—109	..	4 2 7
75,000	5	June 29	6	Malta & Medn., Ltd. .	4¾—5¼	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd. . .	14—15	..	6 13 4
617,946	Stk.	Feb. 24	9¾	Newc'tle & Gatesh'd Con.	285—240	..	4 1 3
252,355	Stk.	Jan. 3	3½	Do. 3½ p. c. Db. Stk.	113—117	..	2 19 10
150,000	5	May 26	8	Oriental, Ltd. . . .	7—7½	−¼	5 6 8
135,000	5	„	8	Do. New, £4 10s. pd.	6—6½	..	5 10 9
15,000	5	„	8	Do. do. 1879, £1 pd.	1—1¼	−¼	5 6 8
60,000	5	Mar. 11	7	Ottoman, Ltd. . . .	5—5½	..	6 6 2
500,000	100	June 1	6	People's Gas of Chicago 2nd M. Bd.	103—108	..	5 11 1
848,070	10	May 26	6	River Plate Ord.. . .	9—9½	..	6 6 4
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	97—99	..	4 0 10
250,000	10	Apl. 29	10	San Paulo, Ltd. . . .	15—16	−½	6 5 0
135,000	Stk.	Mar. 30	10	Sheffield A.	245—248	..	4 0 8
209,053	„	„	10	Do. B.	245—248	..	4 0 8
447,427	„	„	10	Do. C.	245—248	..	4 0 8
5,213,168	Stk.	Aug. 12	5½	South Metrop., 4 p.c. Ord.	141—144*	+½	3 14 0
1,185,846	„	July 14	3	Do. 3 p. c. Db. Stk. .	101—104	+1	2 17 8
60,000	Stk.	Mar. 11	12	Tottenham and A. Edmonton B.	285—295	..	4 1 4
60,000	„	„	9		305—315	..	4 3 9
182,380	10	June 10	7	Tuscan, Ltd.	12½—13½	..	5 3 8
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red. .	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313—318	..	3 6 0
150,000	„	„	5	Do. 5 p. c. Prf. . . .	170—175	..	2 17 2
160,000	„	„	4½	Do. 4½ p.c. Pf. Stk., 1875	148—152	..	2 19 3
175,785	„	Mar. 30	4½	Do. 4½ p. c. Db. Stk. .	157—162	..	2 15 7
1,720,560	Stk.	Apl. 15	8	East London, Ord. . .	225—230	−2	3 9 7
654,740	„	June 29	4½	Do. 4½ p. c. Db. Stk.	157—160	..	2 16 3
390,000	„	„	3	Do. 3 p. c. Db. Stk..	103—105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115—118	..	3 3 7
310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	142—147	..	2 14 5
708,000	Stk.	Aug. 12	14	Kent	364—369*	+11	3 15 11
160,000	„	„	7	Do. New, 7 p. c. max..	210—215*	+½	3 5 1
1,043,800	100	June 29	10	Lambeth, 10 p. c. max. .	298—303	..	3 6 0
406,200	100	„	7½	Do. 7½ p. c. max..	227—232	..	3 4 8
350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
500,000	100	Aug. 12	13½	New River, New Shares	425—430*	..	3 1 8
1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	166—171	..	3 10 2
126,500	100	„	6	Do. do. 7½ p. c. max. .	157—162	..	3 14 1
489,200	Stk.	„	5	Do. do. 5 p. c. Prf. .	168—172	..	2 18 2
1,019,585	„	Apl. 15	4	Do. 4 p. c. A Db. Stk.	141—144	..	2 15 7
1,155,066	Stk.	June 10	10	West Middlesex . . .	297—302	..	3 6 3
200,000	„	„	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
200,000	„	Mar. 11	3	Do. 3 p. c. Db. Stk.	104—106	..	2 16 7

* Ex div.

competitive lighting. Although this settlement is worth vastly more than the expense incurred in procuring it, still your Committee regret that the town has been forced into any expense whatever in regard to the matter. By the settlement thus at last happily effected, the Gas Company have been put in this position, that they cannot make more than reasonable profit for all future time. While their legitimate interests are protected, they are also defined and limited, so that the public of Stirling have every reason to wish them prosperity. On the other hand, the town has really lost nothing that it valued; and it has gained much of great value. It is true that the Gas Company cannot now be forced to sell under the Burghs Gas Supply Act of 1876; but this cannot be reckoned a loss, because public opinion was strongly expressed last year against compulsory purchase. It is true also that the Gas Company have statutory permission now to open streets for repairing old pipes or laying new ones. But this is no loss; for such permission was given voluntarily over half a century ago. It was ratified and confirmed by an agreement between the town and the Gas Company in 1862, and is acted on at the present time. What the town has gained is, specially, that the Gas Company are now put under statutory restrictions of the most stringent kind. They are bound under penalties to supply excellent gas; and their possible dividends are fixed at a fair amount, and cannot be increased without gas consumers becoming partners in the profits, and getting, in reduced prices, by far the greater share of them." The Committee express gratification at having secured favourable conditions; but they might have had them in Stirling, without going before a Parliamentary Committee at all, if they had chosen to ask for them. The report is very strange reading, when compared with the statements of some of them while they were still in opposition. A voluminous document, containing the whole of the minutes and correspondence of the Committee, is being printed; and on account of its not being ready, discussion of the report was adjourned for a month. At the same meeting the accounts incurred in the opposition to the Gas Bill were submitted, and were found to amount to £2662. This subject was also continued, in order that the Councillors might consider out of which fund they are to take the money. A very pertinent comment upon the subject is given in the "Stirling Observer" of to-day, in the following note: "We now know what the gas agitation has cost Stirling. Last year's expenses to the town came to £3700; and this year the Corporation have spent £2660 odd in fighting the Gas Company. These two items amount to £6360; and, if the Gas Company's expenses are thrown in—and they may as well be, for the community will have to pay them, too, indirectly—the total cost to Stirling cannot be less than £10,000. This is only in hard cash. What the cost has been in spleen and personal ill-will, can never be known. But £10,000 is a heavy bill to pay without having anything better than rancorous feelings to show for it. Now that it is all past, is there any sensible ratepayer left who will still deny that the agitation which caused all this outlay, lowered the tone of public life, and lost the gas-works to Stirling, was not a blunder of the most colossal kind? And yet it was the work of self-styled public-spirited citizens, and guardians of the Common Good. How they have guarded it, we know. The list of expenses helps the understanding in this respect."

The Glasgow Corporation Gas Department have this week contracted with the Wilsons and Clyde Coal Company, Limited, for a supply of 30,000 tons of coal for the gas-works. This is a further instalment of the year's coal supply, which is being bought as occasion offers.

The Helensburgh gas transfer may be said to be completed, though it is not yet formally recorded. At a meeting of the Town Council this week, it was reported that the shareholders of the Gas Company had agreed to accept the offer of the Corporation. Reasonableness prevailed on both sides; and the result is a peaceable and satisfactory settlement.

At a meeting of the Kilmarnock Town Council on Wednesday, it was reported that the men employed in the gas-works had been insured, under the Workmen's Compensation Act, with the Ocean Accident Corporation, for £3700, at the rate of 15s. per £100 of wages paid; the premium being £27 15s. per annum.

The recently created Burgh Commissioners of Monifieth have entered into an agreement with the newly-formed Gas Company under which the Company bind themselves to supply gas for public lighting at a price not exceeding 5s. per 1000 cubic feet; and the Commissioners bind themselves to take gas for public lighting so long as the Company subsist. They also stipulate that, in the event of the Company wishing to sell their undertaking the Commissioners shall have the option of acquiring it, either by mutual agreement or by arbitration. When the agreement was laid before the Commissioners this week, there was some criticism of the obligation to take gas so long as the Company subsist. At this there need be no wonder, for it is a restrictive condition, and might have been left out. The agreement was maintained by Provost Stewart to be of the very essence of a fair and equitable arrangement; and the Commissioners adopted it.

An arbitration has been completed between the Edinburgh and District Water Trust and the Clippens Oil Company, Limited, for the fixing of the price to be paid by the Trust for shale, limestone, and freestone which the Company are prevented from working out. The Company claimed £16,750 for shale and limestone, and £20,000 for freestone. Sheriff Jameson, who was Oversman, has awarded £9000 under the first claim, and £2250 under the second.

The Corporation of Arbroath still pin their faith to the scheme for obtaining a water supply from underground. This week they held two meetings, at both of which the subject was discussed. At the second, they had before them a report by their Engineer (Mr. M'Culloch, of Dundee), in which he pointed out that there had been recently a considerable increase of water, which he placed at 441 gallons daily per lineal yard of the adit. From this he argued that if the adit were entirely completed, and the same ratio of extra supply continued, there ought to be a total additional daily supply of 440,000 gallons. He had no hesitation in advising the Commissioners to continue operations until the first 200 yards of the adit were driven—future action to be determined by the result. His reasons for this advice were: (*a*) That the test up to now had not been so satisfactory as could be desired, the length of the adit being too small to admit of a satisfactory conclusion being arrived at; (*b*) the present supply was still too small to depend upon for the period which must elapse before a supply from any other source would be available; and

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(c) the cost for the remainder of the 200 yards of the adit would, at contract price, be trifling compared with the cost already incurred. In a discussion upon the report, it was stated that the water-tanks were empty times without number, which is surely a sufficient indication of the serious position of the supply. The Corporation, by 10 votes to 7, adopted the recommendation of the Engineer.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 13.

Sulphate of Ammonia.—Brisk business has been transacted during the week, resulting in a further improvement in values. Buyers have not confined their attention to prompt parcels; but have shown their confidence in the market by making purchases ahead. The main buying has been by dealers. But it is a promising sign that consumers have also contributed to the orders; and their increasing anxiety to buy shows that their requirements are becoming pressing. The prompt business was chiefly done at the prices reached at the end of last week; but at the close quotations are advanced to £9 15s. f.o.b. Leith and Liverpool, and £9 12s. 6d. f.o.b. Hull. For forward delivery, London quotations on Beckton terms have been advanced to £9 10s. to £9 12s. 6d.; and in Scotland £9 12s. 6d. to £9 15s. has been paid.

Nitrate of Soda is slightly easier, on spot, at 7s. 6d. per cwt. for fine quality, ex quay.

LONDON, *Aug.* 13.

Tar Products.—After touching 9d., benzols are held a little more firmly. Producers are becoming very anxious about this article; but with the enormous quantities which flood the market from the coke-ovens on the Continent, as well as those in this country, it is difficult to see how any important improvement can come, unless a better understanding among makers can be effected. This is being broached in England, on the suggestion from influential quarters to sell a good line for gas enrichment at about present prices, and thus restrict the quantity going into consumption for aniline. The low price of benzols, and consequent low prices of anilines, has undoubtedly largely extended the use of these colours; and having regard to the enormously increased output of benzol, and the fact that it is all going into consumption in one form or another, shows that the market has an astonishing elasticity. A fair trade is being done in carbolic and cresols. Anthracene is a dead letter, and prices are nominal. A large trade is reported in prepared tar, which should have some influence on pitch and oils. The value of pitch is maintained; and the outlook is more hopeful.

Average values to-day are: Tar, 12s. to 15s. 6d. Pitch, east coast, 23s. 6d.; west coast, 19s. Benzols, 90's and 50's, 9½d. Toluol, 1s. 1½d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 4½d.* Creosote, 2⅝d. Heavy oils, 42s. 6d. Carbolic acid, 60's, 2s. Naphthalene, pressed, 57s. 6d.; salts, 32s. 6d. Anthracene, "A" quality, 4d.; "B," 3d.

Sulphate of Ammonia keeps firm, at improving rates. A large business is reported in all positions at £9 11s. 3d. to £9 15s. per ton, less 3½ per cent. Sulphate is scarce, and middlemen are evidently oversold.

* By a printer's error last week, this product was quoted at 1s. 2d. (the price of solvent naphtha), instead of 4¼d, which it should have been.—ED. J. G. L.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—An active business continues to be reported as regards all descriptions of fuel, except house-fire qualities; and prices are strong at list rates for the better descriptions of round coal, with a tendency upwards on the lower sorts for steam, forge, and general manufacturing purposes. A feeling of uncertainty, however, prevails as to the probable attitude of the miners, with regard to the settlement proposals provisionally agreed to by their official representatives and the federated coal-owners. There seems to be a determination among the men not to accept the part of the arrangement which provides for an advance of not more than 2½ per cent. at present; and some apprehension exists that serious friction between the miners and the coalowners may arise on this particular point. With regard to trade generally, collieries with very few exceptions—and these are confined entirely to pits raising house-fire coals—are kept on practically full time; and any stock that is accumulating in house-fire descriptions is not more than colliery proprietors are quite prepared to put down on the ground under present circumstances. Common round coals are in good inland demand; while any surplus output is being readily disposed of for shipment at, in most cases, an advance upon recent quotations. At the pit-mouth, best Wigan Arley are firm at 10s. to 10s. 6d. per ton; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; and common house-coal, about 7s. 6d. Steam and forge coals for inland sale average quite 7s. per ton; while for shipment, 8s. 9d. to 9s., and in some special cases where a guarantee of supplies over the present month is required, 9s. 6d. up to 10s., is obtained. Supplies of engine fuel for the most part are plentiful, owing to the increased quantity of slack now being screened; but there is no pressure of surplus output on the market. Prices are well maintained at recent full quotations of 3s. 6d. per ton at the pit for common; 4s. to 4s. 3d., for good medium sorts; and 4s. 6d. to 5s., for best qualities.

Northern Coal Trade.—There is a slightly easier tone in the coal trade of the north, because of the possibility of the end of the strike in South Wales lessening the rush of the demand for fuel. At the same time the whole of the production of the collieries is fully taken up; and both for steam and gas coals there is an abundant demand, and prices are very high where contracts have not been entered into. Best Northumbrian steam coals have varied greatly in price according to the period of delivery; but from 14s. to 15s. per ton f.o.b. may be looked on as the current quotation. For bunker coals there has been a very full demand; and the prices of unscreened qualities may be put as about 10s. 6d. per ton f.o.b. Manufacturing coals are quiet; but the consumption is up to the average. There is no alteration in household coals; the demand being very limited

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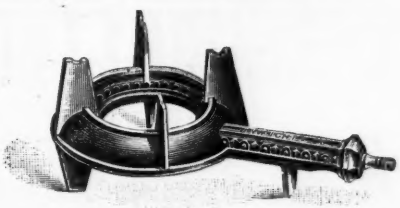

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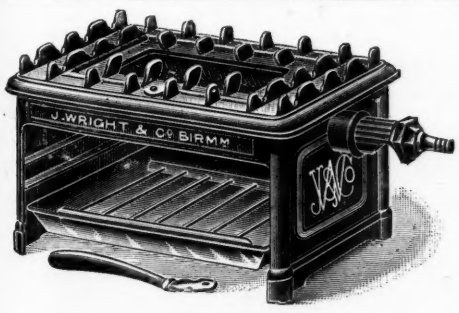

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NEW GAS-GRILLER.

13½ in. wide, 10 in. deep, 9 in. high.

Price 9s.

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at this season of the year. As to gas coals, the deliveries to the great southern gas companies have been increased, and must now be expected to be enlarged as the long nights draw near. For occasional supplies, the quotation is 10s. per ton f.o.b.; and some contracts have been entered into at 9s. 3d. per ton f.o.b., for some months ahead. Coke is steady in demand. Gas coke is being more freely sold; and the stocks are low at works near navigable waters. Prices show no alteration.

Scotch Coal Trade.—Activity in all branches continues, with prices much the same, with the exception of the best quality of ell, which is slightly higher. There is a good demand for everything which is on sale. The prices quoted are per ton f.o.b. Glasgow: Main, 9s. 6d.; ell, 10s. 3d. to 10s. 6d.; splint, 9s. 9d. The shipments were abnormally heavy; there being increases in all the districts. For the week, they amounted to 249,066 tons—an increase of 58,838 tons on the preceding week, and of 57,605 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,610,483 tons—an increase of 1,002,725 tons upon the corresponding week of last year.

The Bridlington Water-Works Arbitration.—Mr. Thomas Newbigging and Mr. G. F. Deacon, the Arbitrators, for the Water Company and the District Council respectively, in the matter of the transfer of the Bridlington Water Company's undertaking, have selected Mr. James Mansergh as Umpire in the event of their not agreeing on terms.

Reductions in Price.—The Directors of the Biggleswade Gas Company have decided, for the current season's public lighting, to allow a discount of 15 per cent., and an extra 5 per cent. if the account exceeds £200. The Directors of the Bedford Gas Company have notified their intention of reducing the price of gas to 2s. 9d. per 1000 cubic feet on and after the 31st of December next.

Tunbridge Wells Water Supply.—The annual report of the Tunbridge Wells Borough Accountant on the water undertaking of the Corporation shows that the total income for the past financial year amounted to £11,337, after deducting £444 for empty properties, amendments on appeal, &c. The total expenditure on revenue account came to £4864, leaving the excess of income over expenditure £6473, out of which £4184 has been employed in respect of dividends and the redemption of Corporation stock, and £644 for extensions of mains; leaving a net surplus of £1645. During the year a suspense account was opened to adjust the capital expenditure defrayed out of the revenue account in respect to the boring works and the Decoy spring, pending the Local Government Board's sanction to the necessary loans. This was done in order to clearly show the true position of the water undertaking; and the result is that the sum of £4786 appears as a surplus on the profit and loss account. This added to the £739 brought forward and the £1645 surplus for the year, makes a total net available surplus of £7170. The report closes with a comparison of the Tunbridge Wells water charges and those of other boroughs, which shows the former to be below the average by 1d. in the pound.

Barnet District Gas and Water Company.—The accounts for the six months ending June 30, which will be presented at the half-yearly general meeting of the above-named Company on the 26th inst., show a balance of £19,221 on the profit and loss account; and the Directors will recommend a dividend, less income-tax, at the rate of 9 per cent. per annum on the "A" and "C" stocks, of 8 per cent. per annum on the "B" stock, and of £6 6s. per cent. per annum on the "D" capital (gas and water stocks). The business of the Company continues to progress.

American Competition for Pipe Contracts.—In the "Journal," on several occasions lately, reference has been made to the success of American pipe makers in securing contracts for the supply of pipes in this country. A writer in the "Shipping World" says the circumstances are not generally understood, and are, in fact, very misleading; so he brought the matter under the notice of a leading pipe and tube maker, who gave him the following explanation: "We are full of work at the present time—so full, in fact, that we cannot, and will not, take additional contracts unless at very tempting figures. We do not require to cut in for work, and we are not doing it. If we really required orders, we would soon quote prices that would easily put American rivals out of court."

New Works of the Cranbrook Water Company.—The works of the Cranbrook Water Company at Hawkhurst have been completed, and were formally opened last Wednesday week. At the pumping-station, there are duplicate pumps, which force the water up to the Hartley reservoir about four miles distance. This reservoir is covered in, and stands upon one of the highest points in the Weald of Kent, about 400 feet above the pumping-station. It holds something like 250,000 gallons of water. The Hawkhurst well yields about 180,000 a day; and there has been a continuous overflow so far. The Goudhurst well gives no less than half a million gallons daily; so that the combined yield is far beyond the present needs. The Company are in a position to supply Cranbrook, Hawkhurst, Goudhurst, Tenterden, Benenden, and other places in the vicinity. The opening ceremony was performed by Earl Cranbrook.

A New Water Reservoir at Chester.—An interesting ceremony, indicating the progress which the Chester Water Company are making in connection with the filtration of the water supply took place last Friday. The event was the opening of a new filtration reservoir, by which it is claimed that the water being supplied to the city will be very much improved from a purification point of view. The new reservoir covers an area of 2000 square yards, with a capacity of 750,000 gallons, and a filtration of 18,000 gallons per hour. The Chairman of the Company (Mr. W. Brown) performed the ceremony of opening the reservoir. In connection with the reservoir, a new and ingenious process, invented by Mr. G. Crow, the Company's Engineer, for subjecting the contents of the reservoir to extra oxidation, with a view to greater purity, has been applied. The construction of the deep filter bed is also a manifest improvement on that previously in use, and the large company present at the inauguration, after seeing the different processes in operation, were unanimously of opinion that nothing had been left undone by the Company to secure for the city a supply of water which is absolutely beyond suspicion.

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	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
ROCHESTER	500,000 Cubic Feet.

	Cubic Feet Daily.
TORONTO (Second Contract; Remodelled)	2,000,000
MONTREAL	500,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000

Settlement of the Water Dispute at Prescot.—According to the report in a Liverpool paper, the litigation in reference to the water supply of Prescot may be considered at an end.

The Supply of Water to Derbyshire Villages.—During the past few months negotiations have been proceeding between the Belper Urban District Council and Mr. J. B. Marsden-Smedley, J.P., the proprietor of the Dethick Estate, for the acquisition of a water supply. It will serve the villages of Holloway, Crich, South Wingfield, Pentrich, and probably others. The population is about 7000, and provision has to be made for 60,000 to 70,000 gallons per day. Mr. Frith is the Engineer concerned, and he has gauged two springs on the estate, which yield about 200,000 gallons per diem. An agreement was recently laid before a special meeting of the Belper Council, and received the seal of the Authority. The villages to be served have been very short of water for years; and at South Wingfield a considerable sum has been spent on boring operations, but without result. The sanction of the Local Government Board will be sought for the scheme.

Messrs. Biggs, Wall, and Co. have secured an order for about 750 tons of cast-iron pipes for South America.

Messrs. Joseph Taylor and Co., of Bolton, have received orders for their latest design of solid-plate lead saturators from the Barnet District Gas and Water Company and the Walker and Wallsend Gas Company.

The Secretary of State for Foreign Affairs has received a dispatch from Her Majesty's Consul at Genoa, stating that tenders are invited by the Municipality of Spezia for the supply of 2500 tons of gas coal for the gas-works at that place. A copy of the conditions of the contract may be examined at the Commercial Department of the Foreign Office any day between the hours of 11 a.m. and 5 p.m.

The Workington Corporation have accepted the tender of Messrs. R. Dempster and Sons, Limited, of Elland, for a new steel foul main for the interior of the retort-house. The same firm are supplying a new exhauster, boiler, and purifiers to the Castle Donnington Gas Company, besides doing general alterations, under the control of the Company's Engineer, Mr. T. Berridge, of Leamington.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London."

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to
No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEWBATTLE, DALKEITH, }

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Aug. 2, p. 278.]

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO., VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS and WAKEFIELD.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER cost less than a HALFPENNY PER CANDLE.
Apply to SADLER AND CO., MIDDLESBROUGH.

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

GWYNNE & BEALE'S
PATENT
GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,
Telegrams: "GWYNNEGRAM, LONDON."
HYDRAULIC AND GAS ENGINEERS
(Late Essex Street Works, Victoria Embankment, London),
Telephone No. 95 Holborn.
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

SPENT OXIDE wanted.
BROTHERTON AND Co., Chemical Manufacturers Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

WANTED, two good steady men as STOKERS. Constant employment for good men. Wages 28s. per week of seven days.
Apply to H. LEGG, Gas-Works, HERNE BAY.

TRAVELLER, representing a Firm of Fire-Clay Retort and Brick Manufacturers, covering North and South Wales, Eastern Counties, Midlands, Shropshire, &c., during Six Months of the Year, will be pleased to hear from Firms desirous of being represented. Is open to extend ground covered.
Address No. 3093, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Meter INSPECTOR, or responsible position in or out of a Gas-Works, by an experienced man. Good Testimonials. Would take Charge of a Small Works.
Address No. 3115, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THOROUGHLY qualified and experienced ENGINEER and MANAGER desires similar appointment, with or without Secretarial duties. Highest references. Satisfactory reasons for changing.
Address No. 3111, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Post as Gas-Works CHEMIST. Advertiser (B.Sc.) has had several Years' Experience in Photometry, and the Testing of Coal, Coke, &c., Gas Analysis and general Analytical Work. Can furnish the best References.
Address No. 3112, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO ACCOUNTANTS AND SECRETARIES.

ACCOUNTANT'S Clerk in Provincial Gas Company desires engagement in Accountant's and Secretary's Office, where an insight could be had and allowed in the practical management of such Office. Preferably where there is a large amount of work.
Address No. 3113, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two steady men as Stokers; also a handy Man to make himself generally useful on a Gas-Works. Permanency to reliable Men. Wages 25s.
Apply to J. H. TROUGHTON, Gas-Works, NEWMARKET.

REQUIRED, experienced Retort Setter, to act as FOREMAN. Wages 45s. per week with overtime.
Apply by letter, to No. 3111, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Manager, single-handed, to manage Works making 4 Millions. Help given when required. House, Coal, and Gas free.
Apply, stating Wages, to J. A. UTTING, Secretary, Kegworth Gas Light and Coke Company, Limited, Kegworth, near DERBY.

WANTED, by the Derby Gas Company, a Young Man as OFFICE ASSISTANT, with good experience as a Draughtsman, quick at Figures. Shorthand writing, &c.
Apply, naming References and Salary required, to C. TAYLOR, Gas Offices, Friar Gate, DERBY.

WANTED, by Monifieth Gaslight Company, Limited, a thoroughly practical WORKING MANAGER, able to lay Mains and Services, fix Meters, &c. House, Coal, and Gas free.
Applications, stating Wages required, and with *copies* of two Testimonials, to be sent to DAVID GOWANS, 15, Castle Street, DUNDEE.

WANTED, a Young Gentleman, with practical training in Designing, Iron Moulding, and Fitting, as ASSISTANT MANAGER at large Gas-Stove Works near Manchester. Must be competent to take sole charge during Manager's absence in both Commercial and Manufacturing Departments. State Experience, Salary, and Age.
Address No. 3105, care of Mr. King, 11, Bolt Court FLEET STREET, E.C.

FITTER AND SERVICE LAYER.

WANTED, a Young Man as General FITTER, for a small Gas and Water Works. Duties will include Laying Gas and Water Services, Fixing Gas-Meters, General Fitting Work, Inspection of Water Fittings, and Small Repairs to Well Pumps, Machinery, &c. Wages 30s. per week.
Apply, by letter only, stating experience, to the SECRETARY of the Gas and Water Company, DUNSTABLE.
Aug. 13, 1898.

SOUTH BANK AND NORMANBY GASLIGHT AND COKE COMPANY, LIMITED.

WANTED, a competent Man as Fitter, METER INSPECTOR, and REPAIRER, to do Smithing and General Repairs of Works, and to make himself generally useful. Must have a good character for Sobriety and Competency. To a suitable Man, the appointment would be a permanency, and liberal Wages given.
Apply, with two recent Testimonials, stating Wages required, to WILLIAM NIXON, Secretary and Manager, Gas-Works, South Bank, R.S.O., YORKS.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two 6 ft. by 3 ft. 6 in. Purifiers, second-hand or new, with 6-inch Connections (in bottom plates), and with Bars, Grids, and Covers Complete; also a 6-inch CENTRE-VALVE to work four Purifiers on, or one off. Delivered on North Wales Coast.
Apply to W. BELTON, Gas-Works, SHREWSBURY.

EXHAUSTERS, pair (Donkin's) 25,000 cubic feet per hour, FOR SALE, with Engine, and four 8-inch Valves, in perfect order, £100. Sold separately, if desired.
Other sizes, new and second-hand, from 2000 to 50,000 cubic feet per hour, ready for delivery.
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, Yorks.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

FOR SALE—
BATTERY CONDENSER, 12 ft. by 12 ft. by 2 ft.
WATER-TANK CONDENSER, 11 ft. by 17 ft. by 3 ft., fitted with 9-inch Pipe Condenser.
HOLMES PATENT SCRUBBER, 5ft. 6 in. diameter, by 21 ft. long.
D-Shaped RETORT MOUTHPIECES (Tangyes Patent), 5-inch Ascension-Pipes, Bench Binders and Pressure-Gauges.
COKE-BREAKING MACHINE, FILTER PRESS, &c.
Large ENGINE, with AIR-PUMP attached, and Two WATER-PUMPS.
Apply to R. M. MACLAY, C.A., 209, West George Street, GLASGOW.

BOROUGH OF BLACKPOOL.

THE Gas Committee invite Tenders for the erection of a THREE-LIFT HOLDER and GUIDE-FRAMING, 150 feet diameter.
Plans, Specification, &c., can be inspected at the Office of the Engineer as below.
Sealed Tenders to be sent to the Chairman of the Gas Committee, at the Gas Office, by Saturday, Aug. 27.
Signed,
JOHN CHEW,
Engineer and Manager.
Gas Office, Princess Street, Blackpool.

TENDERS FOR CAST-IRON SPIGOT AND SOCKET PIPES.

THE Directors of the Isle of Thanet Gas Company are prepared to receive TENDERS for 1420 Yards of 4-inch, and 1000 yards of 6-inch good CAST-IRON SPIGOT AND SOCKET PIPES, to be delivered either by Water or Rail. The Pipes to be in 9-feet lengths.
Tenders to be sent in on or before Friday, at Ten a.m., Aug. 19, 1898, addressed to the Chairman of the Company.
Further Particulars may be had from the Manager, Mr. J. Dougall.
The Directors do not bind themselves to accept the lowest or any Tender.
By order,
THOMAS C. FULLER,
Secretary.

SOUTH SHIELDS GAS COMPANY.

TO COALOWNERS.

THE Directors of the South Shields Gas Company invite TENDERS for the supply of 40,000 Tons of clean, unscreened GAS COAL for delivery into Craft and at the Company's Depôt, South Shields, as required, from September, 1898, to June, 1899, inclusive.
The Directors reserve to themselves the right of taking the Coal in one or more lots.
The lowest or any Tender not necessarily accepted.
Particulars as to Deliveries, &c., may be obtained at the Gas-Works, on application to Mr. W. J. Warner, the Engineer.
Sealed Tenders to be delivered to the undersigned not later than Friday morning, the 26th inst., endorsed "Tender for Coal."
J. H. PENNEY,
Secretary.
Gas Offices, Chapter Row,
South Shields, Aug. 12, 1898.

NEWTON-IN-MAKERFIELD URBAN DISTRICT COUNCIL.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the above Council invite TENDERS for the surplus TAR which may be produced at their Gas-Works for a period of One Year from the 1st of September, 1898, to the 31st of August, 1899 (approximate quantity about 320 Tons), delivered in the Contractor's own Tanks, free on rails at Earlestown Railway Station (L. & N.W.).
Form of Tender may be obtained from the undersigned.
Tenders, endorsed "Tar," addressed to the Chairman of the Gas Committee, Town Hall, Earlestown, Newton-le-Willows, to be delivered at my Office not later than Aug. 20, 1898.
The Committee do not bind themselves to accept the lowest or any Tender.
W. W. SHIRLEY,
Clerk to the Council.
Town Hall, Earlestown,
Aug. 4, 1898.

STRATFORD-UPON-AVON CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of about 4000 Tons of good screened GAS COAL or NUTS during the ensuing Twelve Months.
Forms of Tender and full Particulars can be obtained upon application to
J. S. CRANMER,
Manager.
Aug. 10, 1898.

CONTRACT FOR GAS COAL.

THE Para Gas Company, Limited, invite TENDERS for the supply and delivery, during the Year ending the 1st of September, 1899, of 2400 to 3000 Tons of best screened GAS COAL in monthly quantities as may be directed.
Full Information in regard to the conditions of Tender may be obtained from the undersigned, with whom, also, Tenders should be lodged not later than the 25th of August, 1898.
J. A. PATTULLO,
Secretary.
Para Gas Company, Ltd.,
8, Hill Street, Edinburgh.

HAWORTH URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive TENDERS for the CONVERSION of an old STONE GASHOLDER TANK into a TAR and LIQUOR TANK, as per Plans and Specifications prepared by the Gas-Works Engineer.
Further Particulars may be obtained on application to the Gas-Works Manager, Gas-Works, Haworth.
Sealed Tenders, marked "Tar Tank," to be delivered to me the undersigned not later than the 26th of August, 1898.
WM. ROBERTSHAW,
Clerk to the Council.
1, Burlington Chambers, Keighley.

LEIGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the purchase of the surplus TAR, produced at their Works for the Year ending the 31st day of August, 1899.
Further Particulars and Form of Tender may be obtained from the Manager, Mr. John Foster.
Tenders, endorsed "Tar," to be sent to me not later than Twelve o'clock noon on Monday, the 22nd day of August, 1898.
By order,
PEREGRINE THOMAS,
Clerk to the Council.
Town Hall, Leigh,
Aug. 5, 1898.

TO ENGINEERING CONTRACTORS.

THE Corporation of Halifax are prepared to receive TENDERS for the supply and erection of CONTINUOUS STORAGE HOPPER, STAGE FLOORS, HYDRAULIC and FOUL MAINS, and other work required in their New Retort House.
Copy of Specification, Prints, and Form of Tender, with other Particulars, may be obtained on application to Mr. Thomas Holgate, Gas Engineer, Halifax.
Tenders, sealed and endorsed "Retort House Fittings," to be delivered to the Town Clerk, Halifax, not later than 10 o'clock a.m., on Saturday, the 27th day of August, 1898.
The lowest or any Tender not necessarily accepted.
KEIGHLEY WALTON,
Town Clerk.
Town Hall, Halifax,
Aug. 13, 1898.

TO CONTRACTORS.

GASHOLDER TANK.

THE Edinburgh and Leith Corporations' Gas Commissioners are prepared to receive TENDERS for the EXCAVATORS', CONCRETORS', BRICKLAYERS', and MASONS' WORK in connection with the construction of a BRICK and PUDDLE GASHOLDER TANK, 252 ft. 6 in. diameter by 37 feet deep at their New Works at Granton, near Edinburgh.
Specification and Schedule of Quantities may be obtained on application to the Engineer, Mr. W. R. Herring, on payment of a sum of £5, which will be returned on receipt of a *bond-fide* Tender. The Drawings and Sections may be inspected, and any further Information obtained upon application to the Engineer at his Office, New Street, Edinburgh.
Tenders are to be lodged by Ten a.m. on the morning of the 17th day of October, endorsed "Tender for Gasholder Tank," and addressed to the undersigned.
The Commissioners do not bind themselves to accept the lowest or any Tender.
JAMES M'G. JACK,
Clerk to the Gas Commissioners.
25, Waterloo Place, Edinburgh.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE OF THREE AND A HALF PER CENT. DEBENTURE STOCK.

NOTICE is Hereby Given, that the Directors have instructed Mr. ROBERT MACK, Auctioneer, to SELL BY AUCTION, at the Offices of the Company, Grainger Street West, Newcastle-upon-Tyne, on Wednesday, the 31st day of August, 1898, at Twelve o'clock noon precisely, £12,500 of the NEWCASTLE-UPON-TYNE AND GATESHEAD GAS DEBENTURE STOCK (Perpetual), bearing Interest at the rate of 3½ per cent. per annum, payable Half Yearly on the 1st of July and the 1st of January, being part of the moneys authorized to be raised by the Newcastle-upon-Tyne and Gateshead Gas Act, 1896.
For Conditions of Sale and further Particulars, apply to the undersigned.
THOS. WADDOM,
Secretary.
Chief Offices: 33, Grainger Street West,
Newcastle-upon-Tyne Aug. 5, 1898.

MITCHAM AND WIMBLEDON DISTRICT GAS LIGHT COMPANY.

(INCORPORATED BY ACT OF PARLIAMENT, 1867.)

NOTICE is hereby Given, that the SIXTY-THIRD ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of this Company will be held in the Board-Room, at the Works, Mitcham, in the County of Surrey, on Tuesday, the 30th day of August, 1898, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and a Statement of the Accounts for the Half Year ended the 30th day of June last, to declare a Dividend, and for General Business.

The TRANSFER BOOKS WILL BE CLOSED from the 15th inst. until after the Meeting.

By order,
BENJAMIN GREEN,
Secretary and Manager.

Offices and Works,
Western Road, Mitcham.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Offices, Willoughby Lane, Tottenham, on Saturday, the 27th day of August inst., at Twelve o'clock noon precisely, to receive the Report of the Directors, and Statements of Accounts for the Half Year ended the 30th day of June, 1898, to declare a Dividend for the same period, for the Election of Two Directors and an Auditor for the Ensuing Year, and for transacting General Business.

The TRANSFER BOOKS WILL BE CLOSED for CONSOLIDATED STOCKS from the 12th to the 29th of August inst., both days inclusive.

By order of the Directors,
JAMES RANDALL,
Secretary.

Offices of the Company: Willoughby Lane,
Tottenham, Aug. 12, 1898.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.
CHESTERFIELD.

FENTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and delivery of 200 or more 3-light DRY PREPAYMENT PENNY METERS.

Further Particulars may be had from the Manager.

Tenders to be addressed to the Chairman, Gas-Works, Fenton, on or before Twelve o'clock noon, Monday, the 22nd inst.

The lowest or any Tender not necessarily accepted.

F. H. DARWIN,
Manager and Secretary.

Gas Offices, Fenton,
Aug. 10, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

AUTOMATIC METER REGISTER

The Meter Life Book specially adapted, and revised for "Slot" Meter Registration by
ROBERT P. KEYS.

In sizes to record 1000 Meters, with Index, Half Bound £2 2 0
To record 500 Meters £1 15 0
To record 250 Meters £1 11 6
The only Easy System yet projected.

PUBLISHED BY
WALTER KING, 11, Bolt Court, Fleet Street, E.C.

GAS PURIFICATION BY
HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

UNEQUALLED.

Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

NOW READY.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel-Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION OF THE

HANDBOOK
FOR
GAS ENGINEERS and MANAGERS.

By THOMAS NEWBIGGING, M.Inst.C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry. About fifty additional Illustrations are given; and a Steel-Plate Engraving of William Murdoch, the Inventor of Gas Lighting.

— *PRINCIPAL CONTENTS.* —

Coal; Chief Kinds of Coal; Analyses of Coals and Cannels; Storage of Coal; Spontaneous Ignition of Coal; Gases Occluded in Coal; Testing of Coal for its Producing Qualities; Gas Production; Retort-House; Inclined or Sloping Retorts; Retort-Stack; Retorts; Retort-Settings; Regenerative System of Heating Retorts; Flues and Draught; Analysis of Furnace Gases; Retort-Bench Mountings; Hydrocarbon and other Gases and Vapours; Retort-House Tools and Appliances; Machine Charging and Drawing; Condensation; Naphthalene; Condensers; Exhausters; Steam Engines and Boilers; Washers; Tower Scrubbers; Washer-Scrubbers; Bye-Pass Mains and Valves; Tar and Liquor Wells and Tanks; Purification; Purifying House; Purifiers; Limestones and Lime Burning; Station Meter and other Indicating and Recording Apparatus; Gasholder Tanks; Gasholders; Governors; Main Pipes; Main Pipe Joints; Wrought-Iron and Steel Main-Pipes; Laying of Main-Pipes; Discharge of Gas through Main-Pipes; Service-Pipes and Fittings; Public Lighting; Consumers' Gas-Meters; Testing-Meters; Internal Fittings; Gas Testing Appliances and Methods; Tests for Impurities; Illuminating Power; The Aerorthometer; Foreign and other (proposed) Home Standards of Light; Jet Photometers; Specific Gravity of Gas; Enrichment of Coal Gas; Public Illuminations; Coloured Fires; Illumination Devices; Use of Gas for Purposes other than Lighting; Residual Products; Coal Tar; Ammoniacal Liquor; Sulphur Recovery; Coal Products; Elementary Substances; Chemical and other Memoranda; The Gas Industry; Cost of Gas-Works; Miscellaneous; Bricks and Brickwork; Mortar and Concrete; Iron, Steel, and other Metals; Velocity and Force of the Wind; Office Memoranda; Epitome of Mensuration; Arithmetical and Algebraical Signs; Multipliers; Table of Diameters, Circumferences, Areas of Circles and Sides of Equal Squares; Weights and Measures; French Weights and Measures—Decimal System; Money Tables.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

NEWBATTLE CANNEL.

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Yield of Gas per Ton . . .	11,205 Cubic Feet.
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Coke (of good & pure quality)	13¾ Cwt. per Ton.
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Tar	163 lbs. (Avoir.) per Ton.
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HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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ANALYSIS.

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Sulphur	0·58 „
Ash	2·78 „

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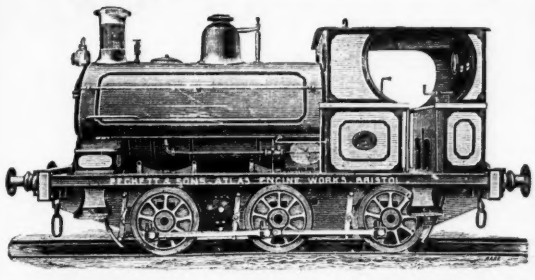

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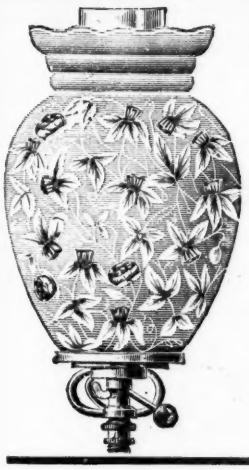

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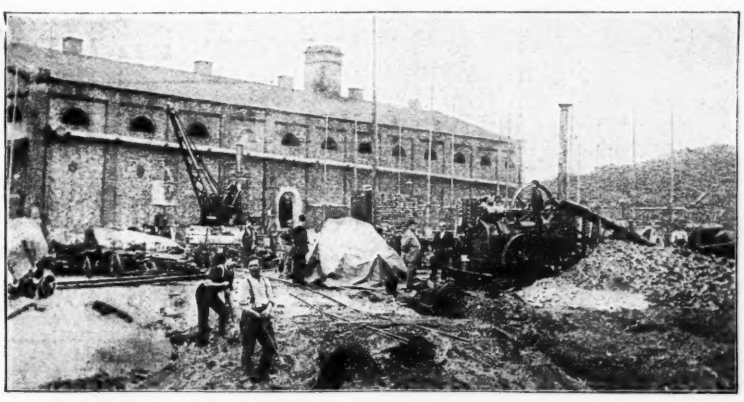

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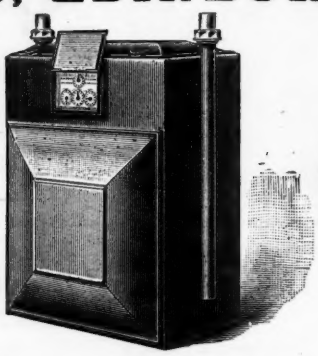

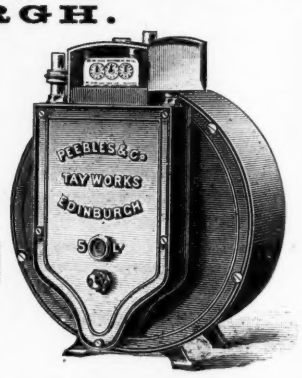

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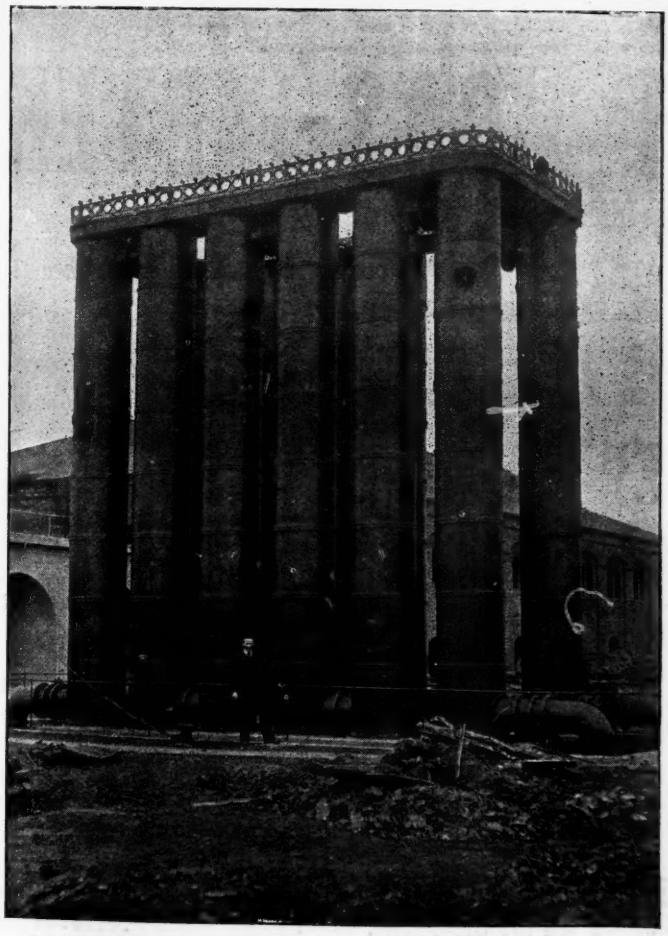

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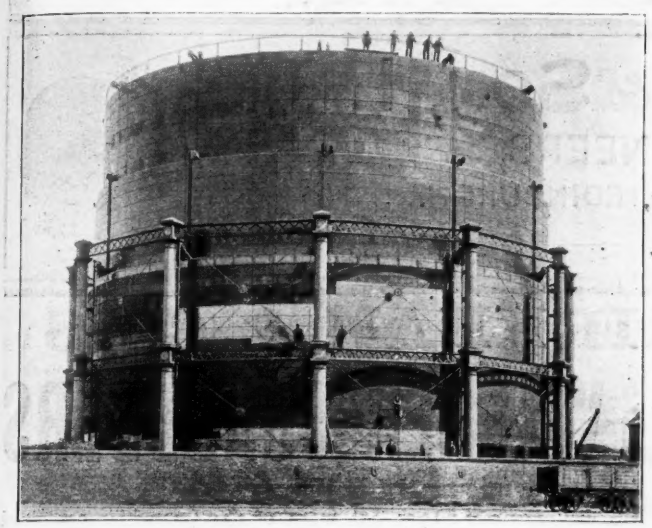

Four-Lift Gasholder, 120 ft. by 24 ft., three Lifts working on Patent Cables (Pease's System). Wallasey; 1897.

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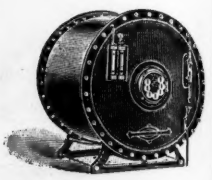

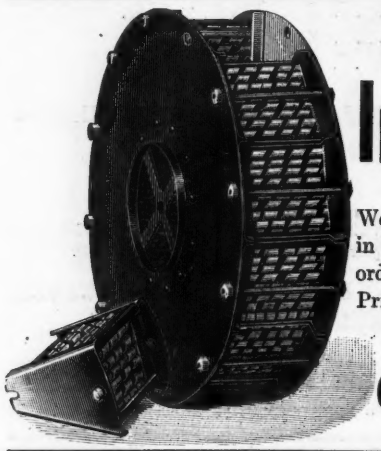

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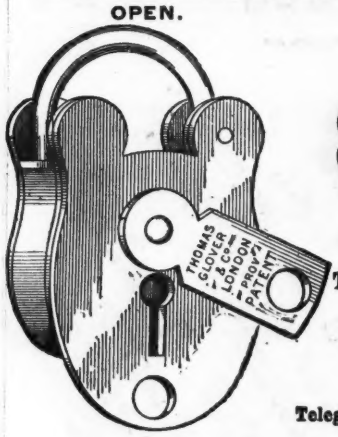

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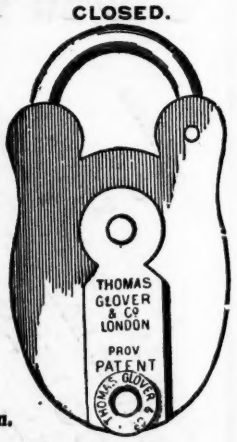

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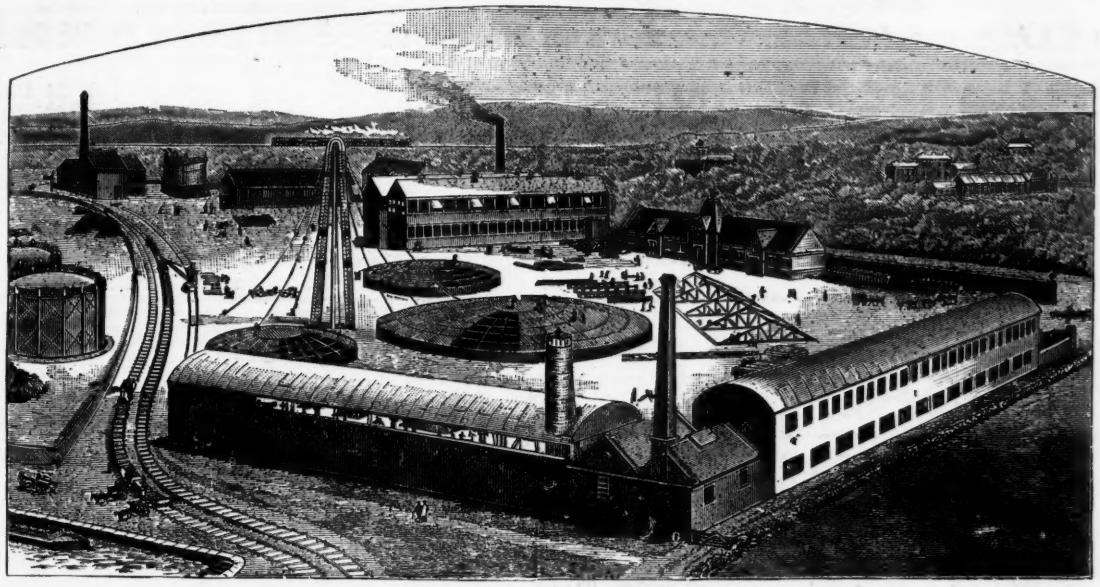

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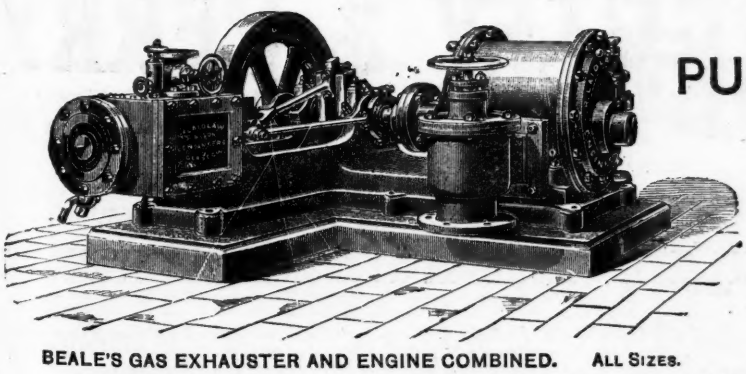

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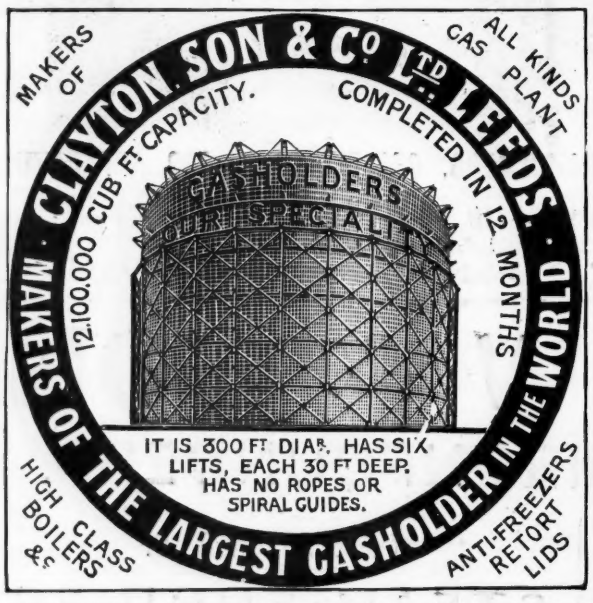
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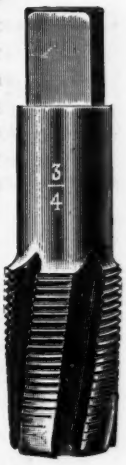

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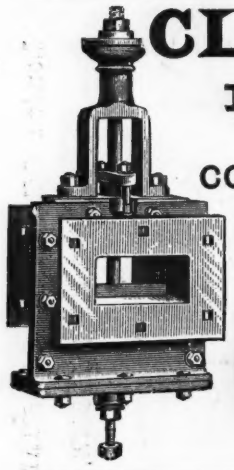

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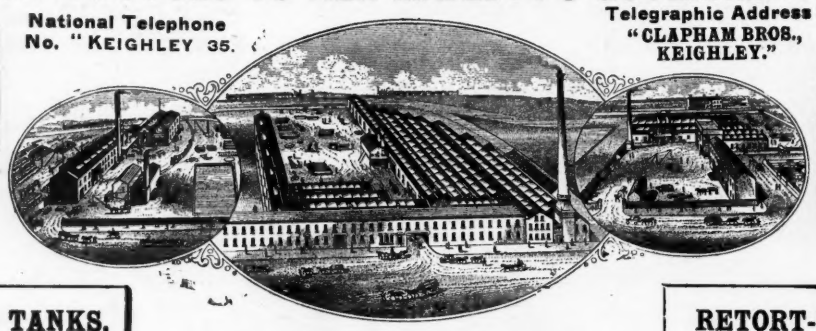

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